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Editor: Allan Burney
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Cover:
The bulk of the Belfast is demonstrated nicely in this fine air-to-air study by the late Steve Piercey. This photograph previews an article on HeavyLift Cargo Airlines, the sole operator of the type (see pages 562-567, this issue).

Frontispiece:
A prelude to the 'Saudi buys British' news item on page 542. A Tornado GR1 of No 617 Squadron based at RAF Marham accompanied by a Hawk of the Tactical Weapons Unit at RAF Brawdy. The Tornado is in standard NATO camouflage with underslung fuel tanks and ECM pods. The Hawk, with the markings of No 79 Squadron on its air defence grey camouflage, is carrying Sidewinder AIM9L missiles. *Photo: RAF*

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AirWAVES

AS 1985 draws to a close, there is time to reflect on the events and decisions that have made it such a turbulent year for aviation. In particular, the civil side of the business was dealt a severe blow in the series of tragic accidents that 'grounded' the public's faith in the industry. Rightly, this low-point will be the abiding memory of the year, but we must not forget either the manner in which the industry responded. By year's end there emerged a number of significant airliner orders with the world's major manufacturers declaring record sales (not least from Boeing). It is to be hoped that this encouraging trend marks the promised return to 'boomtime' for the world's airlines; the outlook certainly looks better than it has done for a long time.

Looking more specifically at the UK, 1985 will be remembered as the year that decisions were made, decisions that will shape the structure of the aviation industry for years to come. It started off on a controversial note with the selection of the Tucano as the RAF's next generation of basic trainer. Then came the long-awaited decree on the development of Stansted as London's third airport and finally, to sighs of relief that were almost audible, the EFA project was launched. A much needed bonus came with the massive aircraft order from Saudi Arabia, rounding off the year nicely. We have previously opined on all the above topics and supported most of the decisions so, all in all, 1985 can be regarded as a year of consolidation for the UK industry. How will 1986 compare? No doubt it will seem a quieter and more stable time as words are put into actions, but the assurance is there that Britain will maintain its role as a leading aviation power.

56 for 86

For *Aircraft Illustrated*, too, 1985 has been a significant year and we are pleased to announce expansion plans for 1986. In response to the continued support that you, the reader, have given us — together with the success of the US edition and promotional 'bumper' issues — we will be increasing the number of pages in *Aircraft Illustrated* from 48 to 56 next year. This will enable a more in-depth news coverage and additional photographs with the regular features. Regrettably, the extra cost of production requires that we raise the magazine's price by 15p, from £1.00 to **£1.15**.

AirNEWS

Saudi buys British

'The Ministry of Defence is pleased to announce that HRH Prince Sultan bin Abdul-Aziz, the Minister of Defence and Aviation of Saudi Arabia, and the Right Honourable Michael Heseltine, Secretary of State for Defence of the UK, have signed on behalf of their respective Governments a Memorandum of Understanding providing for a major new phase in the co-operation between the Royal Saudi Air Force (RSaudAF) and the Royal Air Force (RAF). HRH Prince Sultan has ordered 48 Tornado IDS aircraft, 24 Tornado ADVs, 30 Hawks and 30 PC-9 trainers as part of the Saudi plan to continue the modernising of both the operational and training activities of the RSaudAF.'

These were the words that heralded the biggest arms sale in Britain's history and which updated earlier reports that the sale was to comprise only of Tornado IDS and Hawks (see last month's issue, page 486).

It is reported that the RAF will provide considerable help in the short term to enable the RSaudAF to build up in-theatre experience. Initially the RAF will provide a Tornado-experienced servicing team to work alongside BAe and Saudi tradesmen, but by 1988 it is anticipated that the Saudis will take over the task, assisted by BAe in a similar manner to the existing Lightning and Strikemaster contract.

The programme for training Saudi aircrew, both in the UK and Saudi Arabia, is still under consideration. If additional British instructors are required, then the RAF will have time to train them from its own resources before the Saudi Hawks come into service.

The deal means that the RAF will have to interrupt its own procurement programme so that the RSaudAF can take delivery of its first batch of 20 Tornado IDS aircraft next year. Deliveries of the total order should be completed by 1989.

Payment for the aircraft and related support services will be partly by oil, but the proportion is unlikely to exceed 50% of the total cost involved.

Mr Heseltine confirmed that — as was the case in Britain's sale of Lightnings to the RSaudAF in 1966 — there are restrictions on the resale of the Tornados and Hawks.

The 30 PC-9 turboprop trainers will be built by Pilatus but delivered 'green' to BAe for final fitting to Saudi requirements.

Wellington recovery

The Wellington bomber 'R for Robert' recovered from the bottom of Loch Ness in Scotland, in a dramatic and well-publicised lifting operation in September, is now back at Weybridge where it was built by Vickers-Armstrongs in 1939. After restoration it will go on display in the new Brooklands Museum of motor-racing and aviation which is scheduled to open to the public in 1987.

The Wellington is the only surviving example of the 11,461 built to have seen action. The only other survivor in the Hendon Museum, is a trainer that saw no active service.

'R for Robert' (Mk 1A, s/n N2980) a veteran of 14 operations during the last war, was on a training flight from RAF Lossiemouth when an engine failed and the pilot was forced to ditch in Loch Ness. The pilot and co-pilot paddled ashore in their dinghy, without even getting their feet wet. The rest of the crew had baled out safely, except for the rear gunner who was killed after his parachute malfunctioned.

The Wellington was discovered seven years ago during a search for the legendary Loch Ness monster. The main part of the fuselage, with wings, engines and undercarriage attached, was still intact, and the tail section was recovered later. Engineers were amazed at the condition of the aircraft — nuts and bolts could still be turned by hand, and a tail-light lit up when connected to a battery.

Tornado's new 'recce' system

Flight trials have begun in a Tornado aircraft of the infra-red sensors for a new generation reconnaissance system being developed by the Air Weapons Division of British Aerospace and Computing Devices Company for the RAF. The system will be fitted to RAF Tornado GR1 aircraft and is being developed and supplied under fixed price contracts.

The Tornado system incorporates a BAe sideways looking infra-red (SLIR) system and Linescan 4000 airborne infra-red surveillance system. It will put the RAF's reconnaissance capability ahead of that of other air forces in the western world. For the first time in a tactical aircraft, cameras have been completely replaced by an all-video system integrated with an advanced infra-red sensor system. When fully operational the Tornado reconnaissance system will provide a high quality picture of the battlefield.

The RAF requirement for the new system stipulates the need to identify targets close to the horizon while the aircraft is flying fast and low by day or night and in all weather. Mounted internally in the fuselage, the system provides horizon-to-horizon across track coverage with roll stabilisation, and gives a real time TV display in the cockpit. In the Tornado, the output from the IR sensors is instantly video tape recorded and the operator in the rear cockpit can also monitor the scene while the sortie is under way, both in real time, directly from the sensors or in near real time by replaying videotape recorders. The system offers a high definition therma picture which can be magnified or enhanced at the touch of a button. The infra-red imagery can show buildings, vehicles, equipment and personnel beneath camouflage nets and suspected 'targets' can be enlarged for further study. The location can be pinpointed for further reference or follow-up action, all while the reconnaissance aircraft is continuing its sortie or heading home.

Eagle 'eyed'

A McDonnell Douglas F-15 Eagle is the first fighter aircraft to test the US Air Force Joint Tactical Information Distribution System. The new system, which gives the F-15 pilot instantaneous access to locations of friendly and enemy forces, will also be available to land and sea-based military units. Flight tests in the F-15 are being conducted by McDonnell Douglas under a contract with the US Air Force and evaluations are scheduled to continue until February; at which time the aircraft will be turned over to the US Air Force for further tests.

Using the new system, an F-15 pilot sees information of a colour display which locates other aircraft and surface-to-air missile launch sites. Aircraft are identified on the screen as either friendly, hostile or unknown. US Air Force plans call for all future F-15s and some F-15s now in service to be fitted with the system.

● The US Air Force anti-satellite missile (ASAT) was tested for the first time on 13 September when, after launching from an F-15 flying from Vandenberg AFB, it successfully intercepted and destroyed an orbiting target. The missile was released at an altitude of around 40,000ft and 'knocked down' an old research satellite orbiting at a height of 300nm.

An F-15 Eagle tests the navigational portion of the new US Air Force Low Altitude Navigation and Targeting Infra-Red for Night (LANTIRN) system. The system is located in a pod under the F-15's left air intake. The tests mark a step in the development of the F-15E, a dual role fighter which will serve as a fighter/bomber while retaining the air superiority capabilities of current F-15s. LANTIRN will permit navigation and pinpoint bombing accuracy at night and in adverse weather. The targeting portion of the system will be carried in another pod beneath the other inlet. The US Air Force plans to buy 392 F-15Es. First flight of the F-15E is scheduled for December 1986. *Photo: McDonnell Douglas*

India selects Airbus

The Boeing 757 suffered a blow at the hands of Airbus Industrie when Indian Airlines cancelled a letter of intent for the Boeing twinjet and placed instead an order for 19 Airbus A320s, with options on a further 12 of the type. The aircraft on firm order will be delivered during 1988-90, with the options (should they be taken up) following thereafter. The A320s will be powered by the International Aero Engine consortium's V2500 engine and will, say Indian Airlines, offer a more economical package — both in fuel efficiency and unit cost — than the Boeing 757.

The contest for the Indian order was keenly fought between the two manufacturers and although Boeing lost, it can take solace in the fact it was able to report a record month for sales in September with the 737-300 emerging as its year's best seller (see Texas Air entry in this month's 'Airliner Orders and Deliveries' table).

Above:
An RAF Buccaneer maritime attack aircraft seen over the smouldering wreck of the former 2,400-ton frigate HMS *Salisbury* moments before the 32-year old vessel sank and . . .

Right:
. . . the final moments seen from the cockpit of the Buccaneer which sank her. The RAF had been using the old hulk as a target for a training exercise held recently involving attacks by an RAF Nimrod armed with the Harpoon air-to-surface sea skimming missile and Buccaneer maritime attack aircraft armed with laser guided bombs.

ATR42 approval

The Aerospatiale/Aeritalia ATR42 twin-turboprop regional transport received its Type Certification from the French and Italian authorities in late-September. The award of the certification, which covers the ATR42-200 and ATR42-300 models, was granted on the schedule laid down at the launch of the programme in the latter half of 1981.

Powered by Pratt & Whitney PW-120 engines, the ATR42 made its maiden flight on 16 August 1984 and, by mid-September 1985, the three aircraft used in the certification programme had amassed over 1,100 flying hours.

At the time of certification, the *Avions de Transport* Consortium (Aerospatiale/Aeritalia) had recorded more than 90 orders and options for the ATR42 and its stretched version, the ATR72 (66-74 seats). Entry into service of the first ATR42 by the regional carrier Air Littoral is scheduled for December.

Dave Barker and Richard Stair — an obituary

As a sad postscript to the 'Cross Swords Aerobatic Team' article in the June issue, it was with great regret that we learnt of the tragic and untimely deaths of two of the team's members, Dave Barker and Richard Stair, in a flying accident at Wellesbourne Mountford airfield on 8 September.

Both men had attended a meeting at the Warwickshire airfield during the afternoon to finalise plans for a Rothmans Aerobatic Team Reunion/Air Display to be held later that month and were giving their usual impromptu departure display routine when the incident occurred in the team's Pitts S-2E G-BKTC.

Will King, the team's manager, has informed us that sadly the name of 'Cross Swords Aerobatic Team' will be no more; with the death of Dave, the driving force behind the team, together with the loss of Richard, the second pilot, it would be impossible to continue.

Plans are going ahead to stage a Rothmans Reunion at Wellesbourne next year which will combine as a memorial to the two men. We are sure all readers will join us in extending our deepest sympathy to the families and acquaintances of Dave Barker and Richard Stair.

Rescue award for FAA

The Fleet Air Arm has been awarded the Prince Philip Helicopter Rescue Award for the remarkable rescue of Lt-Cdr C. Waghorn Royal Navy from Brabant Island in the Antarctic.

Lt-Cdr N. R. Thomson, the Detachment Commander of No 826 NAS, with Lt-Cdr J. J. White, the Flight Commander HMS *Endurance* Wasp Flight and Leading Aircrewman J. J. Doyle received the Prince Philip Helicopter Rescue Award from the Guild of Air Pilots and Air Navigators. The rescue, which took three days and nights to achieve was undertaken in hazardous Antarctic conditions and only succeeded by the 'combination of skill, courage and teamwork of the FAA helicopter crews involved'.

On 5 March 1985 RFA *Olna* was despatched with two No 826 NAS Sea Kings embarked, to join HMS *Endurance* and its Wasp flight off Brabant Island to attempt the rescue of Lt-Cdr C. Waghorn.

Lt-Cdr Waghorn was the leader of a Joint Service Expedition to Brabant Island, a remote and desolate place on the edge of Antarctica. Two days before the despatch of the rescue team he had broken his leg after a fall from an 'ice bridge' over a crevasse. He was now lying in considerable pain nearly 800 miles from civilisation, 3,500ft up a snow-covered glacier and sharing a flimsy tent.

RFA *Olna* arrived off Brabant Island on 7 March and, in conjunction with HMS *Endurance*, started what would turn out to be a marathon 36 hours rescue operation, continually hampered by the weather. Throughout 7 March and the early part of the 8th, the rescue attempt was frustrated by low cloud, severe turbulence, gale force winds and the snow 'white out' conditions prevailing.

The rescue operation culminated during the afternoon of 8 March when a temporary break in the weather allowed HMS *Endurance's* Wasp to be launched yet again in an attempt to finally locate the campsite. The helicopter 'hugged' the mountainside for 15min and finally managed to locate the two men through a chink in the dense low cloud. The camp was seen on the jagged rock face situated between two large crevasses at the head of a glacier. Unable to undertake the rescue of the two men with his Wasp, the pilot radioed *Olna* and *Endurance* to find that *Olna* and the Sea Kings were still enshrouded in thick fog.

The Wasp made an approach to the tent to ascertain the condition of the survivors and having done so they heard that despite the thick fog, the Sea Kings were airborne and were now only 10min flying time away. With the cloud still intermittently obscuring the campsite and with a thick bank of fog advancing on the tent, it was decided the Wasp should remain on station (with very little fuel remaining) until the Sea Kings arrived. The Sea Kings approached at low-level from the West flying up the glacier managing to remain in visual contact with the ground and began hovering some 100 yards from the camp. At this point with barely enough fuel to reach its parent ship and with the rescue assured the Wasp left the area and returned to HMS *Endurance*.

The Sea Kings then carried out the rescue of the two men. Hovering with virtually no visual references and with large amounts of driven snow making visibility very poor, they finally plucked the men from their cold ledge just minutes before the campsite was once again enveloped in thick fog.

RAF Accident reports

Nimrod MR2, XV257
Date: 3 June 1984. *Parent airfield:* RAF St Mawgan, Cornwall. *Place of accident:* Near Land's End.
Crew: Two pilots, two navigators, one air electronics officer, one air engineer, seven air electronics operators. *Casualties:* Nil.
Circumstances: On 3 June 1984, a Nimrod aircraft took-off on an exercise Search and Rescue (SAR) sortie from its base at RAF St Mawgan. It was carrying in the bomb bay, as part of the SAR equipment, a normal load of 5in reconnaissance flares. In accordance with normal practice, the first navigator switched the flare's release units to live shortly after take-off. Some 30sec later a cockpit indicator warned the crew of a fire in the bomb bay. The captain immediately instructed the co-pilot to fly the aircraft back to base while he transmitted a 'Mayday' call and informed the rest of the crew.

During the return flight ground witnesses saw the Nimrod trailing smoke, with several burning flares, a parachute and other objects falling from the aircraft. The crew were alerted by other fire and overheat warnings in the cockpit together with indications of hydraulic problems, but the aircraft was landed safely and all the occupants evacuated it without injury. Although the fire services quickly extinguished the intense fire, the aircraft was extensively damaged.

Cause: The accident was caused by a reconnaissance flare becoming detached from its carrier and subsequently igniting in the bomb bay. How it came to be released could not be positively determined.

Subsequent action: Pending the results of an investigation into their safety, 5in reconnaissance flares were temporarily withdrawn from use. Once it was established that the flares were safe, and that this case was exceptional, they were reintroduced into service. However, as an additional safeguard, it was decided that they should not be fused unless the bomb bay doors were already open. The station fire crews were commended for their part in saving the aircraft.

Lightning F6, XS920
Date: 13 July 1984. *Parent airfield:* RAF Binbrook. *Place of accident:* 25km north of Hemslingen, Federal Republic of Germany. *Crew:* One pilot. *Casualties:* Pilot killed.
Circumstances: Lightning XS920 was detached to Germany to take part in the NATO Tactical Leadership Programme (TLP). On the morning of 13 July 1984, it took-off as the lead aircraft of a pair of Lightnings to simulate attacks against a four aircraft formation of US Air Force A-10s. The A-10s were to manoeuvre within clearly defined limits to avoid these attacks. Once airborne, the Lightnings were vectored by ground control towards the A-10 formation. The A-10s were flying as two pairs about 10nm apart and a tail-chase developed as the Lightnings approached the rear pair A-10s. When the Lightnings had closed to approximately 1nm behind the two A-10s they were sighted by the A-10 pilots, who then flew two 90deg turns to the right. Lightning XS920 was seen to attempt an attack on one of the A-10s before disengaging. The two A-10 pilots, having seen Lightning XS920 disengage, turned through 180deg to continue on their original track. At the same time, Lightning XS920 turned back towards the A-10s with the result that it was almost head-on to the left-hand A-10, at a range of 12,000ft, slightly high, but descending on a collision course. The left-hand A-10 made two heading changes and descended slightly to avoid the potential collision. However, at an estimated range of 1,500ft from the Lightning, the A-10 pilot considered that the danger of collision still existed so he turned hard right and descended. Lightning XS920 passed to the left of the A-10 and was then seen in a hard right turn, nose slightly low and at a relatively slow speed. Some 3sec later, there was a bright blue flash as the aircraft flew through some power cables, followed almost immediately by a fireball as the aircraft hit the ground. The pilot made no attempt to eject and was killed.

Cause: Examination of the wreckage revealed no evidence of pre-impact structural or system failure. Both engines had been selected to a high power setting and were operating at high rpm on impact. A check of the cockpit warning bulbs revealed that an engine 'Fire Warning' had been lit at impact but it was impossible to discover whether it had been triggered before the aircraft hit the power cables. There was no evidence of a pre-impact fire and it was concluded therefore that, while this 'Fire Warning' could have distracted the pilot at a critical moment, an aircraft fire was not the primary cause of the accident.

While analysing the final flight path of Lightning XS920, it was noted that the camouflage of the A-10 was particularly effective and that it was often difficult to tell if the aircraft was being viewed from head-on or tail-on. It was considered that these two factors could have contributed to the near collision between Lightning XS920 and the A-10. It was also noted that in avoiding the near collision, the A-10 had manoeuvred immediately in front of Lightning XS920 and thus it was thought possible that XS920 could have been affected by the wake turbulence of the A-10 manoeuvre. However, in the absence of any material evidence it was not possible to identify conclusively the final sequence of events leading up to the accident.

Jaguar GR1, XZ395
Date: 22 August 1984. *Parent airfield:* RAF Coltishall, Norfolk. *Place of accident:* North Sea, 20nm ENE of Cromer. *Crew:* One. *Casualties:* One major injury.
Circumstances: On 22 August 1984 a pair of Jaguar aircraft were engaged in an Air Combat Training (ACT) sortie over the North Sea. The sorties comprised a series of tail chases with each pilot in turn acting as the leader. After completing the first tail chase uneventfully, the pilot of XZ395 took the lead and commenced a gentle descending turn to the right. He descended 2,000ft and turned through 120deg before levelling his wings at a speed of 420kt. He then pulled into a wing over manoeuvre to the right with an apex at 13,000ft and a minimum speed of 280kt. As he started down from this wing-over he saw the other aircraft in his half-past-three position at a distance of approximately 150yd and closing. The pilot of XZ395 rolled to gain level flight and to assist the other pilot to extend his spacing. This was achieved by the other aircraft which passed to the rear and below of XZ395.

Having levelled the aircraft, the pilot of XZ395 heard and felt a distant 'thud' through the airframe. At first he thought that he might have collided with the other aircraft but in fact there had been no collision. Shortly afterwards XZ395 suffered a sudden yaw to the right which the pilot was unable to counter. The nose of the aircraft then dropped and it commenced a rapid uncontrollable roll through 360deg to the right and as the aircraft returned to the wings level position it continued to slice to the right. Realising that the aircraft was out of control and approaching 10,000ft, the pilot ejected; he was rescued from the sea 25min later by helicopter and was subsequently found to have suffered a back injury which was classified as major.

Cause: The investigation established that a large rudder movement, in excess of that normally available, would have been needed to produce the yaw manoeuvre described by the pilot of XZ395. There were two possible explanations which could have accounted for this rudder deflection: first, an uncommanded rudder movement and secondly, a control linkage disconnect. Unfortunately, despite the recovery of a large proportion of the wreckage from the sea, no evidence was forthcoming to substantiate either of these two possibilities.

Harrier GR3, XZ992
Date: 29 November 1984. *Parent airfield:* RAF Stanley, Falkland Islands. *Place of accident:* RAF Stanley. *Crew:* One pilot.
Casualties: One major injury.
Circumstances: On the afternoon of 29 November 1984, XZ992 was being flown as the No 2 of a pair of Harriers for a simulated airfield attack at RAF Stanley. The aircraft was approaching the airfield at 250ft and 480kt when the pilot heard a loud bang and felt a jolt through the airframe. His forward vision was obscured by a red mass which enveloped the front windscreen and quarter-light panels, and there was a marked increase in cockpit noise accompanied by buffeting so severe that he was unable to read his instruments. Although he was briefly able to see out of the canopy, he soon lost all external visual reference and became totally disorientated. Because of his disorientation and his known proximity to the ground, he ejected. The ejection took place at extremely low-level with the aircraft in a shallow descending turn over the sea. Although the ejection seat functioned normally, there was insufficient time for the parachute to decelerate the pilot before he hit the sea and he suffered a broken leg, broken arm and dislocated shoulder. He was unable to operate his survival equipment, and would probably have drowned had it not been for the timely assistance provided by two airmen in a Gemini dinghy who had been working nearby, had seen the ejection, and came to the pilot's rescue.

Cause: The accident was caused by the aircraft hitting a large sea-bird, there was evidence to suggest it was a Southern Giant Petrel, a species of similar size and weight to the Black-browed Albatross. The collision with the bird caused severe airframe damage, denying the pilot both visual and instrument references and thereby forcing him to eject.

Subsequent action: Steps have been taken to counter bird activity in the vicinity of Port Stanley Harbour. Automatic inflation for safety equipment is already being developed and should be introduced into service in the near future. The two airmen who rescued the pilot have been awarded.

AirNOTES

● The last of nine **VC10** airliners converted by British Aerospace at Bristol in to air-to-air refuelling tankers for the RAF was handed over in late-September. The tankers operate from RAF Brize Norton with No 101 Squadron.

● BAe Weybridge Division has won a £40million contract to update **RAF Buccaneers**. The work involves improvements to the navigation, radar and electronic warfare systems, with Ferranti and Marconi as major subcontractors. With these updates, it is anticipated that the Buccaneers will remain in service well in to the 1990s.

● The Rolls-Royce Tay-powered **Gulfstream IV** made its maiden flight on 19 September, three months ahead of schedule. The Gulfstream IV has already 'clocked-up' 80 firm orders with negotiations on another 20 at an advanced stage.

● The **Brazilian AF** has placed a contract with Boeing to convert four commercial Boeing 707s to tanker/transport configuration. Work is scheduled to be complete by late-1987.

● The first of 50 **Lockheed C-5Bs** made its maiden flight on 10 September from Dobbins AFB, Ga. The flight lasted over three hours during which the aircraft was flown to 15,000ft and up to 300kt.

● **British Caledonian** has operated a series of trial flights with the Gatwick-Heathrow helicopter over new routes proposed in its CAA application to continue the service, now that the M25 roadlink is open. The tests were conducted as part of the normal heli-link service which operates 10 round trips each day between the two airports. The results are currently being evaluated.

● The **Iraqi AF** is to purchase 24 Dassault-Breguet Mirage F1s it was announced in September. The aircraft will be armed with Exocet anti-ship missiles and will start to be delivered in early-1987.

● Development of the proposed **Shorts 450**, an enlarged 45-seat version of the 360 commuter airliner, has been halted owing to lack of interest from potential customers.

Airliner Orders

Airline	*Aircraft*	*No*	*Ordered*	*Delivery date*
American Airlines*	MD-82	10 c/o	19 Sept	c-Sept 87
Austrian Airlines*	Fokker 50	2-f	26 Sept 85	1987
		2-o	26 Sept 85	n.d.
China Southwest Airlines*	Boeing 737-300	4	16 Jul 85	(see notes)
Indian Airlines*	Airbus A320	19-f	m-Sept 85	1988-90
		12-o	m-Sept 85	c-1990
Maersk Air*	Fokker 50	4-f	5 Sept 85	1-1987
		4-o	5 Sept 85	n.d.
Martinair Holland*	Boeing 747-200C	1	8 Oct 85	Mar 87
Piedmont Airlines*	Boeing 737-300	19-c/o	26 Sept 85	Jul 87-Feb 89
		20-o	26 Sept 85	1988-89
Republic Airlines*	Boeing 757	6-f	2 Oct 85	(see notes)
		6-o	2 Oct 85	1987
Sunbird Airlines*	BAe Jetstream 31	5	2 Oct 85	c-Dec 85-May 86
Texas Air*	Boeing 737-300	25	Sept 85	1986-87
Thai Airways International*	Boeing 747-300	2-f	7 Oct 85	Dec 87 & Mar 88
		1-o	7 Oct 85	n.d.
US Air	Boeing 737-300	2	9 Oct 85	Nov & Dec 87
Western Airlines	Boeing 737-200	8	3 Oct 85	1987
	Boeing 737-300	4	3 Oct 85	1-1986 & Jan 87

Notes

Airliner Orders

American Airlines: The carrier has exercised options to acquire 10 more MD-80s. The options were part of the largest single order of aircraft in the history of commercial aviation — 67 firm orders with options for an additional 100 — when signed on 29 February 1984. This brings to 110 the total number of MD-80s which American has contracted to either purchase or lease from McDonnell Douglas or third party financial institutions.

Austrian Airlines: The two Fokker 50s will operate between Vienna and Graz, Klagenfurt, Linz and Salzburg. Sales of the new type now stand at 38 aircraft to six customers in six countries, plus 12 options.

China Southwest Airlines: The Chengdu-based airline will receive the aircraft in November 1985 and January, February and June 1986. China Southwest Airlines is a newly authorised regional airline developed as a joint effort by Sichuan and Guizhou provinces and the city of Chongguing.

Indian Airlines: See 'Airnews' item.

Maersk Air: The new Fokker 50s will be put into service on Danish domestic routes and on a Billund to London flight.

Martinair Holland: Amsterdam-based Martinair has placed its first order for a Boeing jet. The aircraft is valued at about $100 million.

Piedmont Airlines: The conversion into firm orders of 19 previously held options makes Piedmont the largest customer for the 737-300 with 45 on order. The 19 aircraft are valued at about $500 million and are scheduled for delivery between July 1987 and February 1989. Based in Winston-Salem, NC Piedmont operates an extensive route system throughout the eastern half of the US and also has services to the West Coast.

Republic Airlines: The $240 million order calls for delivery of the first three 757s in December, followed by two in May and one in June 1986. Power for the 186-passenger airliners will be Rolls-Royce RB211-535E4 engines.

Sunbird Airlines: The sixth US regional/commuter airline to purchase Jetstream 31s brings the total ordered by US operators to 61. Sunbird Airlines is a dedicated franchise commuter of Piedmont Airlines and currently serves Piedmont's Charlotte hub. The first three Jetstream 31s will begin operating from the North Carolina cities of Ashville, Raleigh/Durham, Greenville and Charlotte. At the time of the order, a total of 94 Jeistream 31s have been sold with over 60 aircraft currently in service.

Texas Air: Value of the order is more than $600 million. The Texas Air purchase brings total Boeing orders during September to 60 aircraft — the best September since 1965 for commercial aircraft sales. It also means that for the first time, the 737 programme has overtaken the McDonnell Douglas DC-9, including the MD-80, in total orders. The 737 has amassed 1,410 orders and the DC-9 1,400. New York Air, a subsidiary of Texas Air, said it will receive 14 of the new Boeing twinjets for delivery in 1986 and 1987. Texas Air will retain 11 aircraft for other uses, including leasing to third parties.

Thai Airways International: The carrier is the first to select the new General Electric CF6-80C2 powerplants for its 747s. Boeing will conduct an engine/airframe certification programme starting early-1987.

Airliner Deliveries

Airline	*Aircraft*	*No*	*Delivered*	*Date ordered*
American Airlines*	MD-82	4	(see notes)	25 Sep 82
CAAC*	MD-82	1	1 Oct 85	12 Apl 85
JAT*	Boeing 737-300	2	Aug & Sept 85	24 Sept 84
Thai Airways International*	Airbus A300-600	2	30 Sept & 3 Oct 85	9 Jan 84

Notes

Airliner Deliveries

American Airlines: The four MD-82s were delivered on 3 September (s/n 1222), 6 September (s/n 1223), 23 September (s/n 1226) and 25 September (s/n 1227).

CAAC: The initial MD-82 to be delivered in the Chinese order for 26; the other 25 will be assembled and delivered by the Shanghai Aviation Industrial Corporation from components manufactured by McDonnell Douglas.

JAT: (Jugoslovenski Aerotransport) The first scheduled European carrier to operate the 737-300 has two more of the type on order (see *December 84*, p537 and *May 85*, p202). The initial example, which entered service on 9 August, is registered YU-AND.

Thai Airways International: The Airbus is the first to be powered by the new General Electric CF6-80C2 turbofan. Thai's A300-600 will initially be operated on routes from Bangkok to the Middle East (Dhahran) and regionally in Asia (to Tokyo and Osaka).

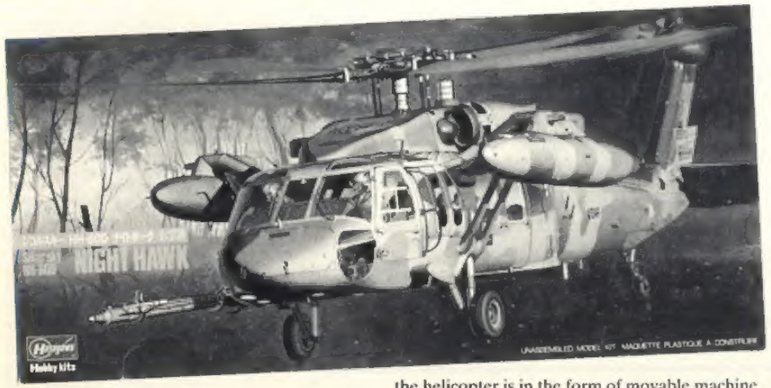
Key:

n.d.=no details, c=commencing, m=mid, o=options, f=firm, c/o=converted options, *=see notes.

Below:
Pakistan International Airlines (PIA) is the first Asia-Pacific region operator of Boeing's new 737-300 twinjet. The airline has taken delivery of five of six on order and is currently operating the CFM56-3B2-powered jetliners on its domestic routes as well as to destinations in the Persian Gulf area and to Nepal, India and Bangladesh. The fifth PIA aircraft is shown as it completes flight testing over northwestern Idaho, prior to delivery. *Photo: Boeing*

AirKITS

James Goulding



A fine Night Hawk

Sikorsky's UH-60A Black Hawk tactical assault helicopter has been developed into a range of variants for different roles. The UH-60A Black Hawk, and two variants — the US Navy SH-60B Sea Hawk and HH-60D Night Hawk — are the subjects of Hasegawa kits in 1 : 72 scale. Amerang Ltd has kindly sent us a sample of one of these, the HH-60D Night Hawk, for review. There is, of course, a commonality of parts between these three kits, with additions and deletions of components according to role.

The overall shape of the model and standard of moulding of parts is excellent. There is always a sharpness about Hasegawa's moulding technique which produces beautiful definition of detail. It is usual now for Hasegawa to use indented skin lines and panels and these are nicely engraved.

Unlike the aggressive-looking Hughes AH-64A Apache, the Sikorsky UH-60A series are elegantly-shaped helicopters and undoubtedly owe much of their efficiency to clean contours. Aerodynamic cleanliness is not, of course, a consideration in the Apache.

A big feature of Hasegawa's model is the cabin layout and detail. The pilots' section is well-appointed, with seats, control columns, instrument panels and directional control bar, all nicely modelled. There are two excellent pilot figures, and five other combat figures in various attitudes. The latter figures have separate limbs to be cemented in any required position. There are separate cabin doors, which can be fixed open to show the internal arrangements.

The rotor head and blades are beautifully detailed and in marked contrast to the simplified components seen in the early helicopter models.

The primary role of the HH-60D Night Hawk is Search and Rescue. Long-range tanks are carried on strut-braced side pylons and the range can be much extended by flight-refuelling, for which a large probe is provided. The tanks, pylons and FR probe are included in the kit. The rescue winch is also provided. Self-defence for the helicopter is in the form of movable machine guns firing out of each side of the fuselage. Air-to-air or air-to-ground missiles can be carried for defence, but are not included in the kit. Presumably these could be Sidewinders, or anti-radar missiles.

Markings are given for a HH-60D of the US Air Force.

These helicopter kits cost £4.59 each.

Modelling for beginners — odd problems

During the course of modelling there are occasions when problems arise — problems which are not always obvious from reading the instruction leaflet. Sometimes the difficulty is a general one that applies to many similar modelling subjects, like painting the insides of jet intakes before final assembly. In come cases, as on the Phantom, it is desirable to paint the blanked-off air intake trunking inside with a dark grey or black before the components of the air intake are cemented in place. The inner faces of these parts must be painted before assembly. It is always a good idea to study the components on the sprue frame, and read the instruction leaflet carefully, before commencing assembly. In this way it is often possible to see where painting would be difficult after the particular parts have been assembled.

Wheels can be a problem if they are attached to a twin-axle frame undercarriage, as on, say, the Lancaster or Mosquito. The tyres and wheel hubs should be painted before adding to the undercarriage legs, and the main frame should at least be partially painted where the wheels would make it otherwise difficult. One problem with undercarriages of the type mentioned is that the axles have to be carefully sprung apart to put the wheel in the correct place and this is often easier to do before all the parts of the assembly have been added. Often, the addition of rear stays and radius rods, which are normally found in these types of undercarriage, tend to stiffen up the main frame and make it more difficult to spring apart. It is therefore not wise to paint these areas of the main frame where other components have to be attached until after assembly is complete, merely painting local areas which are difficult to get at after certain parts have been added.

One of the more difficult model subjects is the Harrier. The little V/STOL fighter-bomber has a small wing, with pronounced anhedral. This, coupled with wing pylons and the jet outlets, makes it very difficult to paint after assembly. The fuselage has to be completely assembled and painted before the wings are attached. In the case of those Harrier models where the jet outlets rotate these have to be painted before adding to the fuselage. In any case there are areas around the jet pipes which must be painted before the pipes are added — otherwise these will stick to the recesses and fairings. On the Harrier, the front pipes exhaust the cold, outer air from the fan engine and are thus painted in the local fuselage colour, whereas the rear pipes exhaust the normal hot gas from the engine's turbines and are normal jet pipe colour.

The fuselage can be completely painted and finished, standing on its main landing gear, before the wings and tailplanes are attached. The wings should be completely painted underneath before cementing to the fuselage. Where applicable to the particular colour scheme the serial number decals should be added before the wing pylons are attached. In the case of the Harrier the serial numbers are arranged either side of the inner pylons. They could be applied after the pylons have been attached, but it is easier to do this beforehand. A narrow band of paint should be scraped away where the pylons are attached.

Because of the anhedral angle it is also easier to paint the under-surfaces of the tailplanes before they are cemented on to the fuselage.

After the wings have been cemented in position and the cement is thoroughly dry, the joint, where necessary, can be carefully filled. In cementing wings to a fuselage I prefer to use liquid cement in small quantities, repeated as necessary. The liquid cement will run into the joint, and this helps to fill the joint, particularly if it is a good fit. The barest minimum of filler should be used along the joint and as little rubbing down as possible to remove only a small amount of paint from the fuselage side of the joint. The upper surfaces of the wings and tailplanes can now be painted.

The outrigger undercarriage units are now cemented into position, but first it is advisable to paint the tiny wheels, tyres and surrounding area of the legs before attaching the units to the wings. Especially in 1 : 72 scale, these wheels are of very small size.

Models of variable-geometry, or 'swing wing', aeroplanes need special treatment during construction. Painting the wings after assembly is not satisfactory. Because the variable-geometry wings pivot inside the fixed wing 'gloves' attached to the fuselage, the inner parts of the wings are only exposed at different sweep angles. The wings must be completely finished before they are fitted on to the pivots and final assembly of the fuselage can take place.

After the wing halves have been cemented together and the joints rubbed down, together with all the usual cleaning up before painting, it is necessary to do a 'dry run' and try out the wing folding. Sometimes there are little high spots around the inside of the wing glove which will scrape away the paint on the wing. It is necessary to ensure that the wing fits well inside the glove at all sweep angles — a good close fit without rubbing tightly against the wing, and not forgetting that the painted wing will be a tighter fit. Smooth down any high spots on the inside of the wing glove aerofoil opening.

Another problem with variable-geometry models, and some conventional types as well, is that the fuselage joint line is along the sides. Because it is necessary to have the wing gloves joined in two halves as on normal wings, the joint has to be continued along the fuselage sides. In cleaning up this joint line the side detail on the fuselage is inevitably lost and has to be put back by scoring panel and skin lines.

AirSCAN

Paul Humphreys

Cost of flying

When I first set out to acquire a PPL it cost £4 per hour, and that nearly broke the bank. And when the price of making-like-a-bird rose to £10 per hour I was forced to give up.

Today a CAA-approved 38-hour course of flying tuition will set you back some £1,300 plus all the little extras, and to hire a single-engined spam-can £55 is about par for the hour.

Now, you'd think that having invested all that cash to learn how to fly, your average aviator would try and fly by the rules and not risk life, limb, aircraft and even more cash. Not a bit of it. Earlier this year the CAA highlighted some court cases which resulted from the unthinking actions of pilots who broke the law. Low flying led the field with fines and costs of up to £500 being imposed. There was a great gaggle of people who flew with expired licences, in uncertificated aircraft or with expired C of As or in aircraft which they were not licenced to fly. These foolhardy flights attracted fines of up to £750. Then there were the cases of falsified or improperly kept technical or personal flying logs, flying without a medical certificate or certificate of experience. The list goes on.

Oh — we nearly forgot the chaps who (i) infringed RAF Upper Heyford and Greenham Common air traffic zones, dropped leaflets and did so without a valid certificate of expertise (£395), and (ii) flew a twin-engined aircraft from north to south bang through the London Control Zone without permission. This latter offender got off lightly with having to pay only £150.

Best of British

It must be the time of the year, because I have been inundated with reports of the 'Best British Airline' and of the 'Best Airline in the World'. While its good to hear the Welkin ring with huzzahs for Orion Airways and British Airways, the two carriers concerned, the voters who have been responsible for these accolades are the readers of two holiday and travel magazines. Not the most perspicacious voters you may think. But, between them, these magazines have a circulation of nearly 700,000, so their net is cast very widely. As the travel magazine goes aboard the aircraft of some 25 airlines and is sold in hotels and airports around the world, and the quarterly holiday magazine is also sold over the counter, then these voters are solid citizens who know a good thing when they buy it. Like an airline ticket.

Clearly, the fare-paying passengers base their verdicts on the standard of service and the food they get in return for the cost of their tickets. This is what carried British Airways to the top of the list which named it Airline of the Year. BA's chief executive, Colin Marshall, owes it not only to the application and energies of the 5,000 cabin staff who have been voted the best and most helpful, but also to the outstanding food and wine they serve with such aplomb and expertise.

Training and recruiting the right people lies at the root of these successes. Orion Airways, as part of its overall efforts to improve, yet again, upon its already impressive service and safety standards, has recently embarked upon a unique training programme for its cabin staff. Groups of stewardesses join their flightdeck colleagues for training sessions in Orion's £5million flight simulator, not to learn how to fly the Boeing 737s, but to act as temporary co-pilot if one of the flightcrew should be taken ill, or become otherwise incapacitated during flight.

In such an emergency the 'cockpit qualified' stewardess would strap the unfortunate crew member in his seat so that he could not obstruct movement of the controls, and then help the pilot by reading check lists and by monitoring the responses given. Training is also given in the operation and safety of the auxiliary power unit and on the deployment and use of the fire extinguishers and escape chutes.

It is this attention to detail in the running of an airline which is winning British operators acclaim and customers.

With apologies to.... no.8

'The Laughing Cavalier' (with apologies to Frans Hals).

DC-3 Fifty

It's hard to believe that the DC-3 is half-a-century old, or that some of these venerable Douglas aeroplanes, some well over 40 years old, are in airline service.

Going even further, our astonishment knew no bounds and our flabber had never been so gasted, when it was revealed that a near 42-year-old C-47A, owned and operated by Northern Airways in the US as part of its cargo fleet, is currently being used to demonstrate the capabilities of Loran-C, a non-precision approach aid for airports. What really takes the biscuit is that it is flying in the markings it wore during Operation Overlord on D-Day in 1944!

For DC-3 and C-47 buffs, this long-in-the-tooth aeroplane, serialled 42-101012, was delivered to the USAAF in January 1944 and dropped paratroops of the US 101st Airborne Division into the Normandy beach-head. Now, in an eight-airport demonstration tour sponsored by the Federal Aviation Administration this mature old bird is helping to pave the way for improved en route navigation and landing procedures in the US mid-continent zone.

Old aeroplanes never die; they just keep flying and flying and flying and . . .

Head in the clouds

William Moody, founder president of Phalanx Organisation Inc, based at Long Beach, Ca graduated from the Massachusetts Institute of Technology with an engineering degree. Along with a dozen or so scientists and technicians he is preparing to produce the 'all-can-do' aeroplane.

Bill Moody's delta-winged canard Dragons exist only on paper, of course. That's why Phalanx claims that these incredible two-seat VTOL vehicles will be able to hover like a helicopter, climb to 60,000ft in six minutes, be capable of Mach 2.5 flat out and able to out-manoeuvre any other aircraft. And all this on two Garrett engines providing a total of 9,400lb thrust.

Then there's the Dragonslayer, by George! Able to carry up to 40 combat-ready troops and zoom off from a 50ft strip in the US, as part of a rapid deployment force, and arrive in the Middle East four hours later.

Just in case the military is not quite as credulous or receptive to this revolutionary aeroplane as the rest of us, Phalanx has on the drawing board a twin-engined civil variant, the MD-18, which will take-off from the same 50ft strip, cruise at Mach 2.5 and with operating costs one half of those of a business turboprop aircraft.

Don't call us, Bill, we'll call you.

Happy Christmas folks. See you next year.

AirREGISTER

Compiled by **Alan J. Wright**

WITH so many of the interesting items recently registered barely reaching these shores before resold, it is with caution that the appearance of a pair of Skyraiders and an Albatross is recorded. Since Aces High changes its fleet with filming needs, most of its aircraft are currently for sale, including the elusive C-119 Packet. The latest acquisitions will no doubt receive a similar fate when discarded by the movie makers. Perhaps the Albatross will enjoy a longer stay. Among the cancellations can be found the civil Vulcan G-VULC, plans for it to remain a part of the UK air show scene proving impractical.

Registration	*Type*	*C/n*	*Owner or operator*
Restorations			
G-ANXC	Auster J/5R Alpine	3135	R. H. M. Green (5Y-UPD/VP-UPD/G-ANXC)
G-APSR	Auster J/1U Workmaster	3499	D&K Aero Services Ltd (OO-HXA/VP-JCD/F-OBHR/G-APSR)
G-ATOZ	Bensen B-8M	18	J. Jordan
G-AWXY	MS885 Super Rallye	5097	R. Whitby
G-AXEG	BAe 125 srs 3B/RA	25172	British Aerospace plc (ZS-CAL/G-AXEG)
Additions			
G-AISS	Piper J-3C-65 Cub	12077	G. R. Lovell (D-ECAV/SL-AAA/44-79781)
G-BLYZ	Edgley EA-7 Optica	005	Edgley Aircraft Ltd
G-BLZC	Flamboyant Ax7-65 balloon	029	T. A. Adams
G-BMBJ	Janus CM	20	Gordonair Ltd
G-BMCJ	PA-31-350 Navajo Chieftain	8252040	Chelsea Land (Finance) Ltd
G-BMCS	PA-22 Tri-Pacer 135	22-1969	W. A. P. Darbishire
G-BMDJ	Price Ax7-77S balloon	003	T. S. Price
G-BMDK	PA-34-220T Seneca II	8133155	Skyline Helicopters Ltd
G-BMDU	Bell 214ST	28101	British Caledonian Helicopters Ltd
G-BMDV	Bell 47G-5	7944	Trent Aviation Services Ltd
G-BMDW	Hoppalong 1	001	D. A. C. Hiske
G-BMDX	Grumman HU-16B Albatross	—	Daedalus Aviation Ltd (51-7161)
G-BMEA	PA-19 Super Cub 135	18-3204	I. M. Callier
G-BMED	Edgley EA-7 Optica	006	Edgley Aircraft Ltd
G-BMEE	Cameron D-105 balloon	1189	A. G. R. Calder
G-BMEF	Beech C90 King Air	LJ-641	National Airways Ltd
G-BMEM	Fournier RF-4D	4037	A. M. Witt
G-BMEN	Short SD3-60	SH3679	Short Bros plc
G-BMEO	Short SD3-60	SH3680	Short Bros plc
G-BMEP	Short SD3-60	SH3681	Short Bros plc
G-BMER	Short SD3-60	SH3682	Short Bros plc
G-BMES	Short SD3-60	SH3683	Short Bros plc
G-BMEU	Isaacs Fury II	11-10179	A. W. Austin
G-BMEX	Cessna F150K	0619	Air Sale plc (D-ECDA)
G-BMEZ	Cameron D-50 airship	1130	Cameron Balloons Ltd
G-BMFB	Douglas AD-4W Skyraider	7850	Aces High Ltd
G-BMFC	Douglas AD-4W Skyraider	7946	Aces High Ltd
G-BMFE	Cameron 56 Truck balloon	1186	Cameron Balloons Ltd
G-BMFI	PZL SZD-45 Ogar	B-657	Anglo Polish Sailplanes Ltd
G-BMFK	PA-28-236 Dakota	8511014	CSE Aviation Ltd
G-BMFL	Rand KR-2	129-11050	E. W. B. Comber & M. F. Levsby
G-BMFM	BAe 146 srs 200A	E2-042	British Aerospace plc
G-GASC	Hughes 369HS	0270S	Southern Air Ltd (G-WELD/G-FROG/OO-KAR)
G-HELK	Cameron N-31 balloon	1191	Hot Air Balloon Co Ltd
G-HLIX	Cameron 80 Oil Can Balloon	1192	Hot Air Balloon Co Ltd
G-HUEY	Bell UH-1H	13560	RAF Benevolent Fund (AE-413 Argentine Army/73-22077)
G-HUKT	PA-28-181 Archer II	28-81901	P. Meyrick (N8321P)
G-JJCB	BAe 125 srs 800B	258022	JCB Excavators Ltd
G-KADY	Rutan Long-Ez	74A-11094	M. W. Caddy
G-MALI	BN-2A-26 Islander	2011	Malinair Ltd (G-DIVE/G-BEXA)
G-OFUN	Valentin Taifun 17E	1063	J. A. Sangster
G-RANY	Cessna 421C	0856	McCarthy & Stone (Developments) Ltd (G-BHLA)
G-RICH	Cessna F152	1440	Stanton Aircraft Managements Ltd (OO-FTC)
G-SKAN	Cessna F172M	1120	Aircraft Rentals Humberside Ltd (G-BFKT/F-BVBJ)
G-TECH	Rockwell Commander 114	14074	P. A. Reed (G-BEDH/N4744W)
G-WYNN	Rand KR-2	129-11093	W. Thomas
Microlights			
G-MMTM	Mainair Tri-Flyer	269-1084-2	Medi-Cine Productions Ltd
G-MMVJ	Southdown Puma Sprint	1121/0013	S. Baker
G-MMWV	Flight Research Nomad 425F	NF-19	R. J. B. S. Escott
G-MMXP	Southdown Puma Sprint	1121/0014	Microflight
G-MMYU	Southdown Puma Sprint	1231/0045	D. G. Hill
G-MMYY	Southdown Puma Sprint	1231/0042	J. C. & A. M. Rose
G-MMZR	Southdown Puma Sprint	1121/0039	S. P. Milne
G-MMZT	Ultrasports Tri-Pacer	JB-01	J. Bell
G-MNAI	Ultrasports Panther XL-S	1003	D. J. Lewis
G-MNAJ	Solar Wings Panther XL-S	1004	D. M. Lyall
G-MNAK	Solar Wings Panther XL-S	1005	Windsports Centre Ltd
G-MNAM	Solar Wings Panther XL-S	1006	Solar Wings Ltd
G-MNAN	Solar Wings Pegasus XL-R	1007	Solar Wings Ltd
G-MNAO	Solar Wings Pegasus XL-R	1008	Solar Wings Ltd
G-MNAR	Solar Wings Pegasus XL-R	1011	Pegasus Schools Ltd
G-MNAY	Ultrasports Panther XL-S	1016	Pegasus Schools Ltd
G-MNBE	Southdown Puma Sprint	1121/0050	P. J. Martin
G-MNBI	Ultrasports Panthers XL	T884-1161XL	Microflight
G-MNBK	Hiway Skytrike	HW-34	R. Colquhoun
G-MNBM	Southdown Puma Sprint	1231/0058	M. W. Hurst
G-MNBN	Mainair Gemini Flash	303-485	D. Adams
G-MNBY	Mainair Gemini	PH-637	A. C. Dommett
G-MNBZ	Medway Half Pint	130SX100	C. J. Draper
G-MNCA	Adams Trike	DA-01	D. Adams
G-MNCC	Mainair Gemini	PMB-01	P. M. Browne
G-MNCD	Harmsworth Tie-Trike	CCH-01	C. C. Harmsworth
G-MNCE	Skyhook Pixie	CRI-51	C. F. Corke
G-MNCI	Southdown Puma Sprint	1231/0059	D. S. Anker
G-MNCK	Southdown Puma Sprint	1231/0051	D. J. Gibbs
G-MNCL	Southdown Puma Sprint	1121/0060	Lasgo Exports Ltd
G-MNCM	CFM Shadow srs R	006	CFM Metal-Fax Ltd
G-MNCN	Hiway Sky Trike 250	NJC-01	N J. Clemens
G-MNCP	Southdown Puma Sprint	1231/0071	J. G. Sealey
G-MNCU	Medway Hybred	26485/10	K. L. Fenn
G-MNCV	Solar Wings Typhoon XL	VEJS-01	V. E. J. Smith
G-MNCX	Mainair Gemini Flash	323-785	Oban Divers Ltd
G-MNCY	Skyhook Pixie	TR1/58	B. F. Johnson
G-MNCZ	Solar Wings Pegasus XL-T	0001	Solar Wings Ltd
G-MNDC	Mainair Gemini Flash	336-885-3	B. J. Bishop
G-MNDD	Mainair Scorcher Solo	358-885-1	Mainair Sports Ltd
G-MNDE	Medway Half Pint	385/85	D. Thorpe
G-MNDG	Southdown Puma Sprint	1121/0057	F. D. Bennett
G-MNDH	Hiway Skytrike	NH2852-1	N. R. Holloway
G-MNDI	MBA Tiger Cub 440	SO-150	F. Clarke
G-MNDL	Southdown Puma Sprint	1231/0072	L. F. Kemmett
G-MNDM	Mainair Gemini Flash	324-785-3	J. P. McGuinness
G-MNDN	Southdown Puma Sprint	1231/0061	C. H. Middleton
G-MNDO	Mainair Flash	SW-WF-0001	Solar Wings Ltd
G-MNDP	Southdown Puma Sprint	1121/0063	Aerotech International Ltd
G-MNDR	Solar Wings Storm	SJS-01	S. J. Sharley
G-MNDU	Midland Sirocco 377GB	MU-011	R. B. Bridgland
G-MNDW	Midland Sirocco 377GB	MU-014	D. K. MacDonald
G-MNDZ	Southdown Puma Sprint	1121/0062	Aerotech International Ltd
G-MNEA	Southdown Airwolf	2232/0067	Southdown International Ltd
G-MNEB	Southdown Airwolf	2232/0068	Southdown International Ltd
G-MNEC	Southdown Airwolf	2232/0069	Southdown International Ltd
G-MNED	Skyhook Pixie	TR1/59	O. McCullogh
G-MNEF	Mainair Gemini Flash	344-885-3	S. Meadowcroft
G-MNEG	Mainair Gemini Flash	360-885-3	D. P. Moxon
G-MNEH	Mainair Gemini Flash	361-885-3	I. Rawson
G-MNEI	Medway Hybred 440	8785/12	R. F. Miller
G-MNEJ	Mainair Gemini Flash	318-685-3	I. A. Thomasson
G-MNEK	Medway Half Pint	4/8785	R. S. Peaks
G-MNEL	Medway Half Pint	5/8785	J. H. Brown
G-MNEM	Solar Wings Pegasus Dual	CS-01	C. Smith
G-MNEN	Southdown Puma Sprint	1231/0075	A. J. Mann
G-MNEP	Aerostructure Pipstrelle P2B	007	M. R. Guerard
G-MNER	CFM Shadow srs B	008	CFM Metal-Fax Ltd
G-MNES	CFM Shadow srs B	010	CFM Metal-Fax Ltd
G-MNET	Mainair Gemini Flash	349-885-3	N. H. Martin
G-MNEV	Mainair Gemini Flash	362-1085-3	Alfasound Ltd
G-MNEW	Mainair Tri-Flyer	MAR-01	M. A. Reeve
G-MNEX	Mainair Gemini Flash	357-785-1	R. D. Schofield & P. Cooper
G-MNEY	Mainair Gemini Flash	365-1085-3	T. G. Elmhirst
G-MNFB	Southdown Puma Sprint	1231/0077	C. Lawrence
G-MNFE	Mainair Gemini Flash	350-885-3	G. M. Douglas
G-MNFF	Mainair Gemini Flash	271-1185-3	D. C. & J. A. Walker
G-MNFG	Southdown Puma Sprint	1231/0078	A. Reynolds
G-MNFH	Mainair Gemini Flash	364-1085-3	E. J. Blyth
G-MNFI	Medway Half Pint	6/25785	C. F. Grainger
Cancellations			
G-AOYO	Viscount 806	264	Transferred to Spain
G-APRM	AW650 Argosy srs 102	6653	Destroyed
G-AREF	PA-23 Aztec 250	27-285	Permanently withdrawn from use
G-AVET	Beech 95-C55A Baron	TE-362	Transferred to US
G-AWZG	HS121 Trident 3B	2308	Transferred to Zaire as 9Q-CTD
G-AZHF	Cessna 150L	72575	Destroyed
G-BEDH	Rockwell Commander 114	14074	Re-registered G-TECH
G-BEJO	Saffery S-250 Firefly balloon	1	Permanently withdrawn from use
G-BKFT	Cessna F172M	1120	Re-registered G-SKAN
G-BFXC	Mooney M20 Mk 21	2620	Transferred to Malta as 9H-ABD
G-BGAV	Rearwin 8135T Cloudster	892	Transferred to US
G-BHLA	Cessna 421C	0856	Re-registered G-RANY
G-BHTW	Cessna FR172J	0486	Transferred to Eire
G-BIOF	Short SD3-30-100	SH3064	Transferred to Nigeria
G-BKBA	BAe 125 srs 400B	25270	Transferred to US
G-BLZU	Short SD3-60	SH3677	Transferred to Canada
G-BMBV	AS332L Super Puma	2114	Transferred to Norway as LN-OMC
G-BTWT	DHC-6 Twin Otter 310	516	Transferred to Netherlands
G-DIVE	BN-2A-26 Islander	2011	Re-registered G-MALI
G-GBCA	Agusta A109A Mk II	7272	Permanently withdrawn from use
G-MJHN	American Aerolights Eagle	3867	Permanently withdrawn from use
G-VULC	Avro 698 Vulcan B2	XM655	Transferred to US
G-WELD	Hughes 369HS	0270S	Re-registered G-GASC

CivilSCENE

Alan J. Wright

RECENTLY there has been a growing queue of would-be operators awaiting a favourable sign from the Civil Aviation Authority. Some will no doubt receive the seal of approval, others will never get the chance to launch themselves into the financially precarious air transport arena. It could be that the latter group will be more fortunate thereby avoiding a similar fate to that of **Metropolitan Airways**, a carrier which, at the beginning of September, became the latest casualty amongst the UK airlines.

Bournemouth-based, this company operated for some years as Alderney Air Ferries, initially flying charters but later embarking upon some scheduled service work. In April 1982 a reorganisation brought the present name, a fleet of Twin Otters and an association with Dan-Air. The latter's Link City operation then became the responsibility of Metropolitan, although the licence was still held by the larger carrier.

Traffic figures steadily improved to the point when aircraft with greater capacity were needed, resulting in three short SD3-30s taking over the routes which by now served Bournemouth, Bristol, Cardiff, Birmingham, Leeds, Manchester, Newcastle and Glasgow. Application was made to the CAA early in 1985 for the various licences to be transferred from Dan-Air. There being no objections, from April Metropolitan was on its own, its smart liveried machines proudly displaying the company name alone. Although its connection had been severed, the Bristol-Cardiff-Cork seasonal schedule continued to be flown for Dan-Air on a sub-contract basis. Subject to route approval being gained, future plans included ambitious international services linking Manchester with Hamburg, Oslo and Stockholm using a pair of One-Eleven 400s.

Fifty per cent owned by Brencham, it was this company which decided to call in the auditors and subsequently the liquidators. After the collapse, the 330s were quickly returned to their owners, another Brencham subsidiary being the lessor of two while the third was leased from the manufacturer. There was some optimism that from one of a number of interested parties, a take-over could be arranged. Unfortunately in such cases debts are also included which would probably deter even the most serious of purchasers. Time will tell. Applications for some of Metropolitan's routes were quickly submitted to the CAA, one of the first batch coming from Air Ecosse requesting the entire network with the exception of Bournemouth and Birmingham. Both Brown Air Services and Air Stansted were also early applicants for the Glasgow-Leeds link, with Ace Aviation seeking direct Glasgow-Bristol and Southampton sectors, the latter operated for a time by Air UK using Bandeirantes.

Over the North Sea a similar type of airline is enjoying better fortunes. **NetherLines** began its operations in January 1985 by flying schedules from Amsterdam to Groningen and Luxembourg. As its Jetstreams were delivered, so the number of routes in the network quickly grew to include both domestic and international destinations. Originally both Gatwick and Liverpool were to be a part of the proposed expansion, but these plans have been shelved for the immediate future. Instead, after ordering another two aircraft for December and January 1986 delivery, it was announced in September that two alternative UK routes were to be introduced, namely to Birmingham and Luton. Within mainland Europe NetherLines is also adding Cologne and Osnabruck to its coverage, with the probable start-up date being November in all cases. It will be interesting to see how the Jetstream fares against the Viscount of London European on the Amsterdam-Luton run, as the British company has steadily built up the load factors since its launch in February.

With the Dutch city already linked to more UK airports than any other in Europe, it was surprising to learn that yet another service is planned. This time **British Midland** hopes to start a low cost/high frequency operation early in 1986 between Heathrow and Schiphol. It was only recently that the airline was given the go-ahead to reinstate international routes from London, which coupled with the Anglo-Dutch agreement concerning the liberalisation of the links between the two countries, provided an incentive to launch the new venture. After British Airways, BMA is the busiest carrier operating from Heathrow with schedules taking in Belfast, Birmingham, East Midlands, Edinburgh, Glasgow, Leeds, Liverpool and Teesside. It is proposed that DC-9s will be used on the new route which will be competing initially with the same type in KLM colours. However the latter is planning to phase them out in favour of Boeing 737-306s and Fokker 100s, so the UK company will be up against some formidable competition which already employs the Airbus A310 on some timings.

One of this type is scheduled for delivery in the spring of 1986 to **Balair**, the charter subsidiary of Swissair. It will be the extended range series 322 version and its arrival will permit the disposal of the carrier's sole DC-8-63, HB-IDZ. Some of the newcomer's time will be spent on trans-Atlantic charters which currently serve Los Angeles, Miami, New York and San Francisco. This business has seen a 40% increase in traffic during the first half of this year compared with the same period in 1984. Balair's DC-10 srs 30 HB-IHK shares in this work as it does on the expanding East African routes. Providing the air transport for IT passengers bound for the Mediterranean and the Canary Islands is another occupation that the trijet is accustomed to undertaking when loads are beyond the capacity of HB-INB and HB-INR, the two DC-9 srs 82s in the fleet. No doubt a similar use will be found for the A310 which will become HB-IPK. A Friendship is also on strength, but this is usually fully occupied on United Nations charters around the Middle East.

As Balair's A310 is prepared for its debut on sorties to North America, **Pan Am** will be introducing the larger A300 on to a newly revived scheduled service between New York/JFK and Shannon, Eire. The daily trip is planned for a 27 April start with non stop flights leaving at 21.00hrs, reaching the Irish airport at 08.50hrs local the next morning. After a turn round of about 2½ hours, the aircraft will operate the return leg to arrive back at 13.50hrs EST. Twelve years will have elapsed since a similar operation was suspended owing to the deteriorating economic situation at the time, brought about by the fuel crisis of 1973. Pan Am in fact had mounted several survey trips with Sikorsky S-42 flying boats from 1937, finally inaugurating a regular passenger service with the more sophisticated Boeing 314 on 8 July 1939. After the war, with suitable landplanes available, piston engined types maintained the route until 3 June 1960 when DC-8s took over, using Shannon as a transit stop on the carrier's Chicago-Frankfurt operation. This particular link will also be included in a new batch of flights to be introduced by Pan Am, others being Chicago-Paris, New York-Milan and Brussels, Washington-Madrid and Los Angeles/San Francisco-Paris.

Still with the Atlantic, a pair of **British Air Ferries'** Viscount 806s have been sold to the Tenerife-based Lineas Aereas Canaries for its inter-island work. Originally it was expected that two would be going on lease to the Spanish company last spring, but somewhat to BAF's relief it is suspected, this deal was not finalised. With the summer season over, the departure of G-AOYM and G-AOYO in return for £3million during September/October did not cause the UK company any capacity problems in the course of its own operations. Despite these two leaving the fold, there is every indication that the type will remain in BAF's employ for a long time to come, since negotiations with the manufacturer could result in a modification programme to give the faithful Viscounts another 15 years life expectancy.

Below:

At the turn of the year NetherLines will receive two more Jetstreams to support PH-KJB and its three colleagues. By then they should be regular visitors to the UK on scheduled links with Holland.

Photo: Alan J. Wright

Left:
A Harrier GR3 of No 4 Squadron has 'right of way' as it taxies out of the autobahn *rastplatz* to begin a sortie.

Below:
Harriers from RAF Gütersloh on the A33 autobahn near Paderborn.

Bottom left:
Clear road ahead. Harrier pilot awaiting clearance for autobahn take-off.

HARRIERS *'HIT THE ROAD'*

Story by **Sqn Ldr J. Beattie,**
photographs by **Barry Ellson**
RAFG/PR

HARRIERS of the RAF operated from a German autobahn for the first-time ever in mid-September in an exercise to test a wartime role for these unique aircraft. A highly mobile unit from RAF Gütersloh took over a 2km stretch of the A33 near Hovelhof, transforming a lay-by into an operations centre and using one lane of the autobahn as a landing strip . . . just one of the many options that would be open to the versatile Harrier in the event of war. The aircraft were from Nos 3 and 4 Squadrons, deployed from their 'home' at RAF Gütersloh as part of NATO Exercise 'Cold Fire', and were watched by large crowds of sightseers as they thundered along the autobahn to prove their capability of operating from this ready-made, if unusual, type of runway.

The exercise proved a success. The stretch of road was carefully chosen with the full co-operation of the German authorities in order to minimise traffic disruption and the closing-off operation was handled entirely by German police. As this unusual exercise took place in the full glare of publicity, providing an exciting spectacle for local townspeople, other aircraft of the Harrier Force were practising another wartime role nearby — their capacity to mount operations from secret hides hidden deep in the woods, securely guarded by armed troops of the RAF Regiment.

Left:
A No 4 Squadron Harrier gets ready for take-off from the A33 autobahn.

Above:
Harrier in the fast lane — a short take-off from the autobahn by a GR3.

Right:
A Harrier from RAF Gütersloh hovering over the A33 *rastplatz* near Paderborn.

Birth of the Hurricane

This picture:
The fully-developed Hurricane Mk I fitted with the Rotol constant-speed three-bladed propeller. The photograph was taken in early 1940 and illustrates well the retraction of the undercarriage.
All photos via BAe Kingston, unless otherwise credited

Golden Anniversary

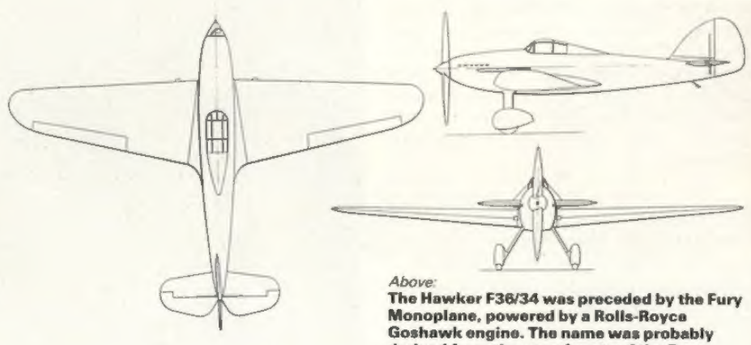
In celebration of the Golden Anniversary of the maiden flight of the Hurricane, **James Goulding** *takes a look at the story behind the development of Hawker's 'High Speed Interceptor Monoplane'*

FIFTY years ago, a sleek monoplane, resplendent in its finish of highly-polished metal plating and aluminium-doped fabric, lifted off from the grass airfield in the centre of the Brooklands racing circuit. The Hawker F36/34 'High-Speed Interceptor' monoplane fighter made its first flight on 6 November 1935 and thereby marked the end of an era; that of the classic Hawker biplane single-seat fighters, two-seat light bombers and two-seat fighters.

At about the time that the Hawker Fury I biplane fighter was beginning its distinguished career with Nos 1, 25 and 43(F) Squadrons (the elite units of the RAF), Sydney Camm and his team were drafting plans for its monoplane successor. At this time Hawkers was also engaged in producing a bigger biplane fighter based on the design of the Fury and conforming to the requirements of Spec F7/30. This aircraft, the PV3, was armed with four 0.303in Vickers machine-guns and was powered by an engine from which much was expected — the Rolls-Royce Goshawk evaporatively-cooled engine. It was planned that the Goshawk was to become the universal power unit for future fighter and bomber aircraft in RAF service.

The Hawker PV3 had a slightly higher performance than the Fury I and was matched by the much-later Fury II, but Camm realised that the only worthwhile increase in speed performance would have to come from a drastic changeover to a monoplane design. It was a facet of Camm's design work that he would not discard well-tried and proven methods merely for the sake of introducing new technology, and the adoption of the monoplane layout was accompanied by the retention of the long-established Hawker method of construction. His new monoplane fighter was at this stage, therefore, closely allied to the Fury concept and was indeed known within the company as the 'Fury monoplane'. Two versions were projected, one powered by the Rolls-Royce Goshawk and the other by the Bristol Mercury VI nine-cylinder air-cooled radial engine.

The general layout of the fighter was designed around a similar fuselage to the Fury, but with a tapered monoplane wing of 38ft span. The overall length of the Goshawk-powered version was to be 28ft 10in. The construction of the fighter would have been similar to the Fury, with a tubular steel fuselage box structure with



Above:
The Hawker F36/34 was preceded by the Fury Monoplane, powered by a Rolls-Royce Goshawk engine. The name was probably derived from the use of parts of the Fury biplane fuselage. *Diagram by the author*

Above:
The Hawker F36/34, allocated the serial K5083, in its original form at about the time of its first flight.

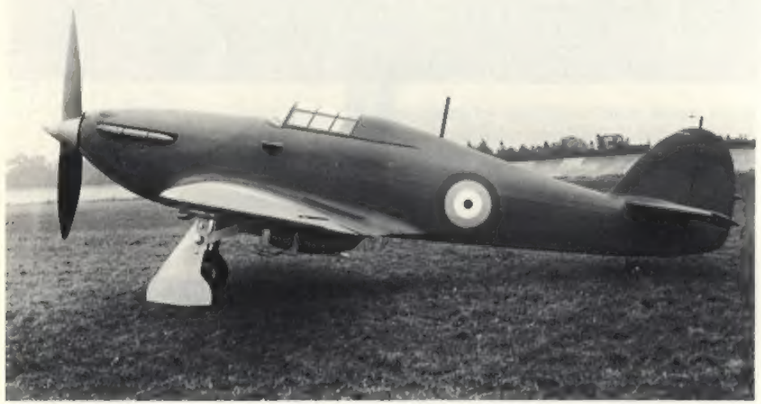
Right:
The ugly, massive fixed-pitch wooden propeller used for the initial flight trials of the Hawker F36/34 was later replaced by a more refined 'two blader'. Note the folding wheel covers, discarded at a later date.

external frames. The forward part of the fuselage would have been covered with thin metal sheet, with fabric covering over much of the remainder. Wing and tail unit construction followed normal Hawker practice. The fixed undercarriage design closely followed that used on the Spanish and Yugoslavian Furies, with single struts and Dowty internally-sprung wheels catering for shock-absorption. The cockpit was totally enclosed, with a rearwards sliding hood.

The 'Fury Monoplane' was expected to reach a top speed of 280mph and was armed with two Vickers 0.303 guns.

As design work proceeded news was received by Camm, and other rival designers, that Rolls-Royce was working on a new 12-cylinder inline-engine called the PV12. Construction of the first PV12 began in 1933 and on 15 October of that year the engine was run for the first time, not entirely successfully. A number of weak points in the design of the engine were revealed. Several of the faults were put right before the engine attempted the 100hr type test, which was successfully completed. At this stage the PV12 weighed 1,177lb and delivered 625hp at 2,500rpm for take-off and 790hp at 12,000ft. There were still technical problems to be overcome before the engine could be considered satisfactory, but to aircraft designers it held the exciting prospect of being able eventually to deliver over 1,000hp. These were early days in the career of an engine that was to become a legend — the Rolls-Royce Merlin. To Sydney Camm and his team the PV12 gave exciting possibilities of revising the Hawker monoplane fighter to attain much higher speeds, with over 300mph the goal.

To this end, Camm redesigned the fighter to take full advantage of the new engine, while still retaining the tried methods of construction. The revised design, known as the Hawker 'High Speed Interceptor Monoplane', was larger than the 'Fury Monoplane', with a wing span of 40ft and an overall length of 31ft 3in. Because it was confidently expected that speeds of over 300mph would be achieved when the engine had developed its intended power output, the Hawker design team decided to incorporate a retractable undercarriage. In 1934 retractable undercarriages were still a novelty and this was Hawker's first experience of designing such a gear for a practical fighter. Wisely, Camm chose a wide-track, inwards-retracting configuration which would permit the fighter to operate from rough fields despite



its obviously higher landing speed. In the event this was to prove its worth in later years on the production Hurricane during the fighting in France and the Battle of Britain, when RAF squadrons had to operate from makeshift airfields.

In the design of the Hawker fighter, the wing was assembled from three major components — the centre section, attached to the fuselage, and the outer wings. The centre section housed fuel and oil tanks, and the retracting undercarriage. It was a rectangular structure constructed around a tubular steel 'box'. Unlike the production Hurricane, the front spar of the wing was straight throughout.

One of the problems facing the designers was that when standing on the ground the wheels had to be in a position forward of the centre of gravity and yet could not retract inwards in a simple manner because of the front spar. Therefore, it was necessary to draw the legs rearwards as they folded while the wheels had to remain level as the undercarriage folded inwards. The solution adopted was a most ingenious rear stay (part of which was pivoted around the lower tubular structural member) which had a universal joint in the upper section. This allowed it to 'break' as the leg was drawn rearwards. The system worked so well that the very sturdy undercarriage never gave any serious trouble during the entire career of the prototype or the production Hurricane, despite big weight increases.

While the Hawker designers worked on the new monoplane, Rolls-Royce was carrying out an intense programme to resolve most of the persisting technical difficulties with its new engine — problems which included cylinder jacket cracking and reduction gear failures. An improved engine, now called the Merlin C, at first failed the official 50-hour Civil Type Test but later, in December 1935, was successful. However, big improvements were being made and the engine was now rated at 955hp at 2,600revs/min at 11,000ft, and the magic 1,050hp at 3,000rpm was available at 12,000ft, with promise of increases to come. A further improved version, the Merlin F, was put into production as the Merlin Mk1. Sydney Camm could now be sure of at least 900hp from the Merlin C engine for early development flying of his fighter and construction began.

At this period there was much discussion within the RAF about future armament requirements, with the eventual decision made that all new single-seat fighters should have at least six and preferably eight of the new Browning 0.303in guns. The Hawker monoplane, though, was armed with two Browning guns in the wings and two Vickers MkIII 0.303in guns in the fuselage, and construction was proceeding on that basis.

In 1934 the Air Ministry issued Spec F5/34 to cover the design of a single-seat eight-gun fighter capable of attaining a top speed of at least 280mph. A number of companies submitted designs for this competition and several prototypes to Spec F5/34 were built and flown from Gloster Aircraft Co, Bristol Aeroplane Co, Vickers-Armstrongs and Martin-Baker (see last month's issue). Hawker's monoplane fighter conformed closely to the specification except in the matter of armament, but it showed such promise that Specification F36/34 was written around the design, requiring the incorporation of an armament of eight Browning 0.303in guns. As this meant a redesign of the wing structure outboard of the centre section, it was agreed that the prototype should be completed and flown on initial trials at least with the original wing and unarmed.

In February 1935, a contract for a prototype was signed and the serial number, K5083, was allotted. By August of that year, K5083 was structurally complete and awaiting covering. Rolls-Royce Merlin C, number 11, was delivered for installation in the new fighter. For early flight trials the Air Ministry agreed that K5083 should be ballasted to represent an armament of only four guns as originally planned, but that eight would be added at a later date.

The aircraft was transported from the Canbury Park Road works to the Hawker Flightshed at Brooklands for assembly and testing in October. The pilot taking K5083 into the air for the first time was to be Hawker's chief test pilot, Flt Lt P. W. S. ('George') Bulman, renowned for his superb handling of Hawker biplanes during displays, as well as his skill as a test pilot.

At the beginning of November 1935, the Hawker F36/34 was assembled, systems tested and weighed in at 5,420lb. It was now handed over to 'George' Bulman for the next crucial stage. Taxying tests followed for Bulman to get the feel of the new fighter and to become familiar with its ground attitude and cockpit vision. After a few fast runs to get used to the controls, all was now ready. On 6 November 1935, Bulman took the immaculate new fighter into the air for its maiden flight. Three months later the prototype went to the Aircraft and Armament Experimental Establishment at Martlesham Heath for service trials. There K5083 undertook performance and handling tests during which a maximum speed of 315mph was recorded at 16,200ft.

There were few problems with the airframe, but the experimental Merlin C engines gave some 'teething' trouble. However, the Air Ministry was well pleased with the new fighter and as the placing of a contract seemed imminent, Hawkers began preparation for a production version.

On 3 June 1936, the company received an order from the Air Ministry for six hundred aircraft and later that month the name 'Hurricane' was officially bestowed on the fighter.

It was originally intended that the production-type Hurricane Mk I would be powered by the Rolls-Royce Merlin I, but an early decision was taken to install the Merlin II engine, and this required a complete redesign of the front fuselage contours. It had been intended to fly the first production-type Hurricane I in May or June 1937, but the change to the Merlin II delayed the first production aircraft, L1547,until October that year. Flt Lt Philip Lucas took L1547 into the air for the first time on 12 October, 18 months from the receipt of the first order.

The Hurricane I differed considerably from the F36/34 prototype, especially in the latter's original form, although some of the components for the production Hurricane were flown on the prototype; such as the radiator and hood design. The production Hurricane was much 'cleaner' than the prototype and the planform of the outer wings differed through the use of a swept back front spar. It is probable that a modified version of the production wing was flown on the prototype when the eight guns were installed.

When the first production machine was rolled out towards the end of 1937, the company had the exciting prospect of a production run of perhaps 1,000 Hurricanes, then an unprecedented amount, but

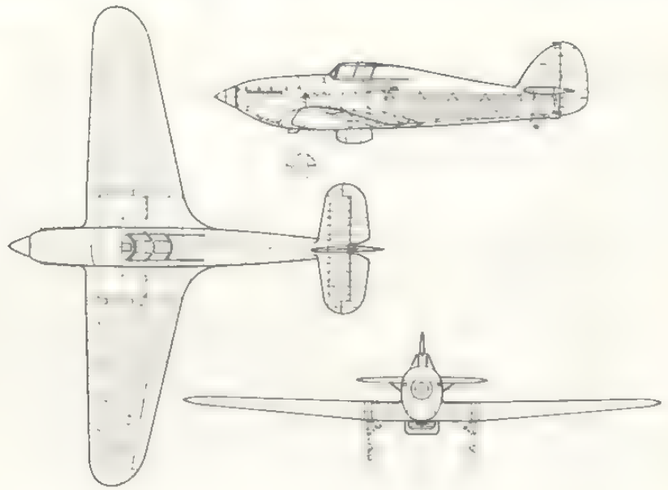
Top left:
The Hawker F36/34 single-seat monoplane fighter viewed from aft. Note the bracing struts on the tailplane, which were discarded later in the flight programme.

Above left:
The first production Hurricane Mk I, L1547, at Brooklands in October 1937. The Hurricane Mk I was generally a much cleaner and more smoothly contoured aircraft than the F36/34 prototype.

Above:
Another view of L1547, the first production Hurricane, with the Brooklands banked race track in the distance. *Photo via the author*

Right:
Hawker Hurricane Is of No 111(F) Squadron at Northolt, the first monoplane fighter unit in the RAF. *Photo via the author*

Above
The familiar silhouette of the Hurricane is shown in this study of a flight taking-off, probably from No 111(F) Squadron and taken in 1938. *Photo via the author*



Right
A general arrangement drawing of the Hawker F36/34 monoplane fighter, which formed the basis for the Hurricane eight-gun fighter. The drawing shows the aircraft in its original form, with strut-braced tailplane, small radiator, a single stiffener on the canopy and folding wheel covers. The wing planform differed from that of the Hurricane in having less leading edge sweep back and more trailing edge sweep forward. On the Hurricane the main wings had swept back front spars instead of straight across as on the F36/34. *Diagram by the author*

there could have been few Hawker employees who could have envisaged an ultimate production in this country alone of 12,780, with more from overseas!

Although the Hurricane was reasonably fast for its day, it was undoubtedly outdated in its structural concept — which limited its development potential as a fighter. Its inferior speed compared to the Bf109E was compensated for by its superb armament. Although the Bf109E included two 20mm cannons in its armament, these were of such low-velocity and poor penetration that its total armament was only about half as effective as the eight Browning guns of the Hurricane. The latter was also much more manoeuvrable than the Bf109E at medium and low altitudes, which made up for its inferior speed.

It was Camm's reluctance to abandon tried methods of construction in favour of much more modern stressed skin construction that proved to be a wise decision for the Nation, for this allowed large numbers of Hurricanes to be built quickly and to be available when they were most needed. It was also an easy aircraft to maintain and repair under the exacting and sometimes primitive conditions prevailing during the intense fighting of 1940. The RAF had good cause to be grateful to Sydney Camm for providing the Hurricane with a robust, wide-track undercarriage, which enabled it to operate from rough, makeshift airfields in France and Britain when the bombing and fighting was at its height. At a time when this country was short of heavily-armed night fighters the wide track undercarriage permitted Hurricanes to be used as night fighters until the Bristol Beaufighter became available in numbers. In this respect the Hurricane proved to be more useful than the Spitfire under the conditions prevailing in 1940.

The Hurricane/Spitfire partnership was ideal for the fighting over Britain in 1940 and proved the case for ordering two types of eight-gun fighter. There would have been very serious problems for the RAF and Britain had the Powers-that-be decided to order the Spitfire alone, which was potentially the better fighter. There would have been too few to meet all the commitments of the RAF because of delays in getting production of that great fighter into top gear. The narrow track of the Spitfire undercarriage also made it less suitable for operations from unprepared fields, and for night flying.

What was needed in 1940 to tackle massed formations of bombers was a strong, straightforward simple fighter with destructive armament and adequate performance. It had to be simple to maintain and repair, sometimes under crude conditions, and it had to be easy for new pilots to fly. The Hurricane was all of these things.

MilitaryMARKINGS

Peter R. March

THIS month's amendments to 'Military Aircraft Markings' detail a number of changes to preserved aircraft. With the 50th anniversary of the first flight of the Spitfire coming up early next year it is inevitable that interest in this classic fighter should be hotting up. Good progress is being made with the construction of a flying replica of the prototype K5054. Charles Church is forging ahead with his 'production line' near Winchester. The ex-Israeli Mk IX PT462 is being rebuilt as a two-seat trainer; Steve Atkins' TIX PV202 has now moved in as a third aircraft alongside the single-seat TE517. It is reported that Doug Arnold's Spitfire XIV MV293/G-SPIT has been sold to Stephen Grey. On the debit side the well known Spitfire T8 G-AIDN/MT818 is now known to be on the other side of the Atlantic, having been seen engine running at Williams Airport, Houston in July this year. Well covered by the media, the recovery of the Wellington N2980 from Loch Ness gives a 100% increase in the surviving examples of this famous bomber. Aces High's Dakota G-DAKS now carries the serial KG874 rather than KG374 with which is has been marked for the past couple of years representing David Lord VC's aircraft. It is uncertain how long the aircraft that have been loaned by the Army Air Corps and the Fleet Air Arm Museum to the new Britannia Leisure Park at Ilkeston, Derby will remain there as this new multi-million pound venture has already got into financial difficulties.

At the modern end of things, the RAF has taken delivery of its fourth and last VC10 K3, No 101 Squadron at Brize Norton now being fully equipped with its nine tankers. It is thought likely that a further five will be converted from the stock of ex-BA aircraft held at RAF Abingdon. No 216 Squadron has ceased operating the original ex-BA TriStars. Four of the aircraft are at Cambridge on conversion to K1 tankers, one has been leased back to BA for a while, and the first conversion ZD950 is on an extensive trial period with the A&AEE. In the meantime two of the ex-PanAm TriStars, ZE704 and ZE705 have joined the squadron at Brize Norton, to be operated in passenger configuration, for trooping flights to the Mediterranean and South Atlantic. As the new Grob Vikings have been delivered far faster than the VGS re-equipment programme can cope with them, they are being stored at Shawbury and now Kemble until they are required. The movement of Jaguars still presents a somewhat complex picture. On 14 September, for example, three Jaguar GR1s were on show at Abingdon and St Athan events carrying No 6 Squadron markings and the code EL. At the JMU, Abingdon work was proceeding on XX966 and XZ399 while XX725 was on show in the static display at St Athan. It seems likely that the Saudi Arabian order for Tornados will mean that Nos 2 and 41 Squadrons will keep their reconnaissance Jaguars in service for up to two years longer than originally planned.

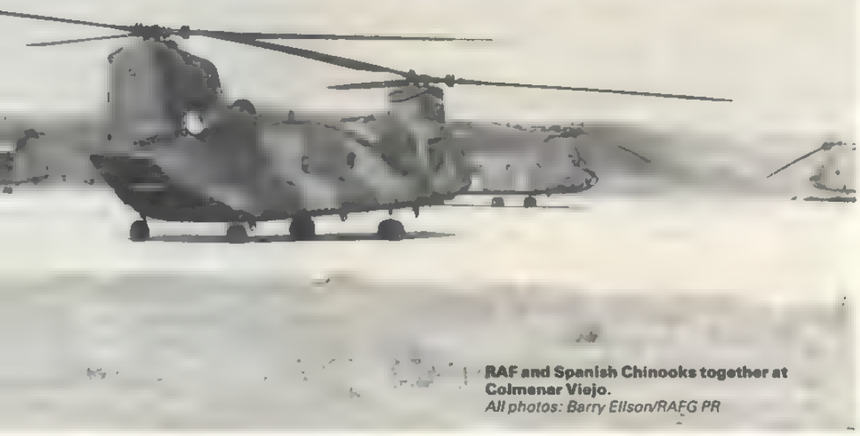
Serial	*Type (alternative identity) 'code'*	*Owner, Operator or Location*
K5054	Supermarine Spitfire replica	Privately owned, Swindon
K2980	Vickers Wellington IA (R)	For the Brooklands Museum, Surrey
DE623	DH Tiger Moth (G-ANFI)	Privately owned, St Athan
EN398	VS Spitfire IX replica (BAPC184)	Imperial War Museum, Duxford
FX301	NA Harvard IIB (G-JUDI)	Privately owned, RAF Marham
KF388	NA Harvard IIB	Wessex Aviation Society, Wimborne
KG874	Douglas Dakota C4 (G-DAKS)	Aces High, Duxford
MT438	Auster III (G-ARET)	Privately owned, Chessington
MV293	VS Spitfire XIV (G-SPIT)	Stephen Grey, Duxford
PT462	VS Spitfire TIX (G-CTIX)	Privately owned, Micheldever, Hants
PV202	VS Spitfire TIX (G-TRIX)	Privately owned, Micheldever, Hants
WB946	Slingsby Sedbergh TX1	RAF Sealand, stored
WB971	Slingsby Sedbergh TX1	RAF Sealand, stored
WB981	Slingsby Sedbergh TX1	RAF Sealand, stored
WB989	Slingsby Sedbergh TX1	RAF Sealand, stored
WB993	Slingsby Sedbergh TX1	RAF Sealand, stored
WG480	DH Chipmunk T10 (D)	RAF FSS, Swinderby
WH904	EE Canberra T19	Newark Air Museum, Winthorpe
WJ574	EE Canberra TT18 (844)	RN, St Athan store
WK126	EE Canberra TT18 (844)	RN, St Athan store
WP809	DH Chipmunk T10 (912)	RNAS Yeovilton Station Flight
WP907	DH Chipmunk T10 PAX (7970M)	RAF Abingdon, stored
WV787	EE Canberra B2/8	Newark Air Museum, Winthorpe
WW388	Percival Provost T1 (7616M)	Wales Air Museum, Cardiff
WZ662	Auster AOP9 (G-BKVK)	Privately owned, Norwich
WZ879	DH Chipmunk T10 (L)	RAF FSS, Swinderby
XG504	Bristol Sycamore HR14	Privately owned, Causewayhead, Strathclyde
XG737	DH Sea Venom FAW22 (220)	Wales Air Museum, Cardiff
XJ481	DH Sea Vixen FAW1	Britannia Park, Ilkeston, Derby
XJ560	DH Sea Vixen FAW2	Newark Air Museum, Winthorpe
XK416	Auster AOP9 (G AYUA/7855M)	LFV&HAC, Cranfield
XL616	Hawker Hunter T7	RAF No 12 Squadron, Lossiemouth
XN157	Slingsby Sedbergh TX1	RAF Sealand, stored
XP779	DHC Beaver AL1	AAC Beaver Training Flt, Middle Wallop
XR718	EE Lightning F3	RAF No 11 Sqn, Binbrook
XS637	HS Andover C1	RAF No 32 Sqn, Northolt
XS935	EE Lightning F6	RAF No 5 Sqn, Binbrook
XT430	Westland Wasp HAS1 (444)	Defence School, Winterbourne Gunner
XV278	HS Harrier	MoD(PE) Rolls-Royce, Filton
XV411	McD Phantom FGR2	RAF No 92 Sqn, Wildenrath
XV460	McD Phantom FGR2 (G)	RAF No 228 OCU, Coningsby
XV701	Westland Sea King HAS5	RN No 819 Sqn, Prestwick
XV755	HS Harrier GR3 (AK)	RAF No 3 Sqn, Gutersloh
XV808	HS Harrier GR3 (L)	RAF No 233 OCU, Wittering
XX102	BHC CC7/2	Britannia Park, Ilkeston, Derby
XX341	HS Hawk T1 ASTRA (1)	MoD(PE) CIT, Cranfield
XX371	Westland Gazelle AH1	AAC, No 12 Flt, Wildenrath
XX725	SEPECAT Jaguar GR1 (J1010) (EL)	RAF No 6 Sqn, Coltishall
XX821	SEPECAT Jaguar GR1 (P)	RAF No 41 Sqn, Coltishall
XX824	SEPECAT Jaguar GR1 (AD)	RAF No 14 Sqn, Bruggen
XZ131	HS Harrier GR3 (N)	RAF No 233 OCU, Wittering
XZ145	HS Harrier T4 (T)	RAF No 233 OCU, Wittering
ZA149	BAe VC10 K3 (H)	RAF No 101 Sqn, Brize Norton
ZA396	Panavia Tornado GR1 (GE)	RAF No 20 Sqn, Laarbruch
ZA543	Panavia Tornado GR1	RAF TWCU/No 45 Sqn, Honington
ZA633	Slingsby Venture T2 (3)	RAF No 616 VGS, Henlow
ZA652	Slingsby Venture T2	RAF No 642 VGS, Church Fenton
ZA679	B V Chinook HC1 (BC)	RAF No 18 Sqn, Gutersloh
ZA714	B-V Chinook HC1 (EX)	RAF No 7 Sqn, Odiham
ZD580	BAe Sea Harrier FRS1 (004)	RN No 801 Sqn, Yeovilton
ZD636	Westland Sea King HAS5 (701/PW)	RN No 829 Sqn, Prestwick
ZD637	Westland Sea King HAS5 (704/PW)	RN No 829 Sqn, Prestwick
ZD719	Panavia Tornado GR1 (BF)	RAF No 14 Sqn, Bruggen
ZD738	Panavia Tornado GR1 (DD)	RAF No 31 Sqn, Bruggen
ZD937	Panavia Tornado F2 (AQ)	RAF No 229 OCU, Coningsby
ZD948	Lockheed TriStar C1 (G-BFCA)	MoD(PE) Marshalls, Cambridge
ZD949	Lockheed TriStar C1 (G BFCB)	MoD(PE) Marshalls, Cambridge
ZD951	Lockheed TriStar C1 (G-BFCD)	MoD(PE) Marshalls, Cambridge
ZD953	Lockheed TriStar C1 (G-BFCF)	MoD(PE) Marshalls, Cambridge
ZE551	Grob Viking TX1	RAF Kemble, stored (also ZE560, ZE562, ZE563, ZE584, ZE602, ZE604, ZE626, ZE627, ZE630, ZE632, ZE633)
ZE554	Grob Viking TX1	RAF No 631 VGS, Sealand
ZE555	Grob Viking TX1	RAF No 631 VGS, Sealand
ZE700	BAe 146 CC2 (G-5-02)	MoD(PE) for Queens Flight
ZE701	BAe 146 CC2 (G 5-03)	MoD(PE) for Queens Flight
ZF520	Piper Navajo C1 (N35823/G-BLZK)	MoD(PE) RAE Farnborough
ZF521	Piper Navajo C1 (N27509)	MoD(PE) RAE Farnborough
ZF522	Piper Navajo C1 (N27728/G-RNAV/ N4261A)	MoD(PE) RAE Farnborough

Deletions

MT818	VS Spitfire T8 (G-AIDN)	To USA — Williams Airport, Houston, Tx
TG536	HP Hastings C1A	Burnt at Catterick
WK162	EE Canberra B2	Crashed on take off, Alconbury 8 Aug 1985
XP105	Westland Wessex HAS1	Burnt at Lee-on-Solent
XS528	Westland Wasp HAS1	To Royal New Zealand Navy as NZ3910
XS532	Westland Wasp HAS1	To Royal New Zealand Navy as NZ3912
XV341	HS Buccaneer S2B	Crashed on landing, Lossiemouth 14 Jun 1985
XZ365	SEPECAT Jaguar GR1A	Crashed nr Meschede, W Germany 9 Jul 1985
XZ989	BAe Harrier GR3 (8849M)	To RAF Gutersloh for ground instruction
ZD635	Westland Sea King HAS5	Crashed Spears Hill, Tayport 21 Jun 1985
ZD952	Lockheed TriStar C1	Leased to British Airtours as G-BFCE
BA19	Mirage VBA — Belgian AF	Crashed 8 May 1985
BD06	Mirage VBD — Belgian AF	Crashed 2 July 1985
FA24	GD F-16A — Belgian AF	Crashed 29 Apr 1985
MT1	Magister — Belgian AF	Crashed 26 Feb 1985
E-179	GD F-16A — R Danish AF	Collided 1 Apr 1985
E 186	GD F 16A — R Danish AF	Collided 1 Apr 1985
R 341	F-104G Starfighter — R Danish AF	Crashed 21 Mar 1985
T 406	MFI-17 — R Danish AF	Crashed 6 Jun 1985
7	Mirage 2000C — French AF	Crashed 14 May 1985
20	Mirage 2000C — French AF	Crashed 30 Jun 1985
34	Mirage F1C — French AF	Crashed 6 Feb 1985
46	Mirage F1C — French AF	Crashed 3 Apr 1985
264	Mirage IIIB — French AF	Collided 16 Apr 1985
365	Mirage IIIR — French AF	Collided 16 Apr 1985

Tiger Moth DE623 seems to have found a new home at RAF St Athan with the Historic Aircraft Collection. *Photo. Peter R. March*

Pegasus - Red and Black



RAF and Spanish Chinooks together at Colmenar Viejo.
All photos: Barry Ellson/RAFG PR

John Dalling *reports on the first British Chinook detachment to Spain*

THE first official visit to Spain by an RAF helicopter unit took place earlier this year when two Chinooks of No 18 Squadron from Gutersloh in West Germany touched down at Colmenar Viejo, 30km north of Madrid, to begin the second half of a squadron exchange. They were returning the compliment to *BHELTRA-V* which sent two of its aircraft to Gutersloh in June. The two units fly the same helicopter and therefore have much the same operational role in support of the army. They have something else in common, a badge depicting Pegasus the winged horse, red in the British version, black in the Spanish.

BHELTRA is an acronym standing for Transport Helicopter Battalion so the unit's title can best be translated as Battalion 5. It is part of *FAMET, Fuerzas Aero Mobiles del Ejercito de Tierra* or Army Air Mobile Forces. It has 12 CH-47s and eight UH-1H helicopters and is the only squadron stationed at Colmenar Viejo. FAMET's main base where all training, support units and logistics are centred.

Another helicopter base visited by the British party was the latest addition to FAMET's inventory, Almagro in Ciudad Real Province, where no fewer than 45 anti-tank Bo105s were to be found, 28 of them equipped with TOW missiles, 12 with guns and the rest dedicated to command and control. As this was only one base and there were other anti-tank helicopters at other bases it would appear that the Spanish take their tank-busting responsibilities very seriously.

Almagro appeared to have been built on what we would call a green field site in the middle of a broad, flat plain where everything, from the maintenance facilities to the accommodation and the swimming pool had to be started from scratch. Pride in what had been achieved was evidenced in the thoroughness with which visitors are shown around.

Another military installation on the Chinook itinerary was the Infantry Academy at Toledo, former capital of Spain, on the Tajo river, the country's longest. Here granite and marble had been put together on a majestic scale to impress soldier and civilian alike with the leading place that military tradition plays in the nation's affairs. The academy had been rebuilt postwar to replace the original (also rebuilt) destroyed in the civil war after a historic 55-day siege.

These and other visits underlined the host nation's determination to enter into the spirit of the occasion, as they saw it, with an outpouring of hospitality that was as generous as it was genuine. It cemented what the British detachment commander, Sqn Ldr Peter Norton gave as one of the main objectives of the exchange, to get to know their opposite numbers as people.

Above.
No 18 Squadron Chinook ZA672/BX hovering above typical Spanish mountain scenery.

Centre right:
Spanish and British aircrew discuss flight plans.

Right
Detachment commander Sqn Ldr Peter Norton chats with the Spanish base commander.

Below
'Bravo X-ray' with the Spanish *BHELTRA* overflying the Infantry Academy at Toledo, former capital of Spain.

HeavyLift Cargo Airlines

Peter R. March *and* **Alan J. Wright** *survey the five successful years of Britain's unique cargo airline and talk to* **P. J. McGoldrick** *(known as PJ throughout the airline industry), HeavyLift's ebullient Deputy Chairman*

THROUGHOUT the 1970s, cargo airlines came and went with monotonous regularity, so it was seen as something of a gamble when the Trafalgar House Group announced the formation of TAC HeavyLift with the aim of certifying the Shorts Belfast for use on outsize and specialist charters. This was in 1978 but it was to be two more years before the new airline was to appear. In March 1980 the first Belfast G-AEPE began operations from Stansted following work to obtain a Certificate of Airworthiness, which in the first instance was on a restricted basis. The effort to obtain full clearance from the CAA took some 20,000 manhours for design, another 25,000 for engineering plus 120hr of flight testing. A full transport C of A was awarded on 23 March 1982 at a cost of over £3million to HeavyLift.

In common with the CL-44 and Hercules, the Belfast is capable of lifting heavy loads, but the internal dimensions producing an 84ft long hold of some 11,000ft³ gives it a distinct advantage over its two rivals. There is a 12ft² limit under the wing centre section, but in front and behind this the hold space increases to 13ft 5in in height and about 16ft in width. As an added bonus the rear loading ramp can be used for carrying cargo weighing up to 5,000lb. Bulkier consignments can be handled, therefore, which is essentially the reason for the airline's entry into the air cargo business. It does make the name HeavyLift Cargo Airlines, which was adopted on 1 September 1980, something of a misnomer since many of the outsized loads carried are relatively light.

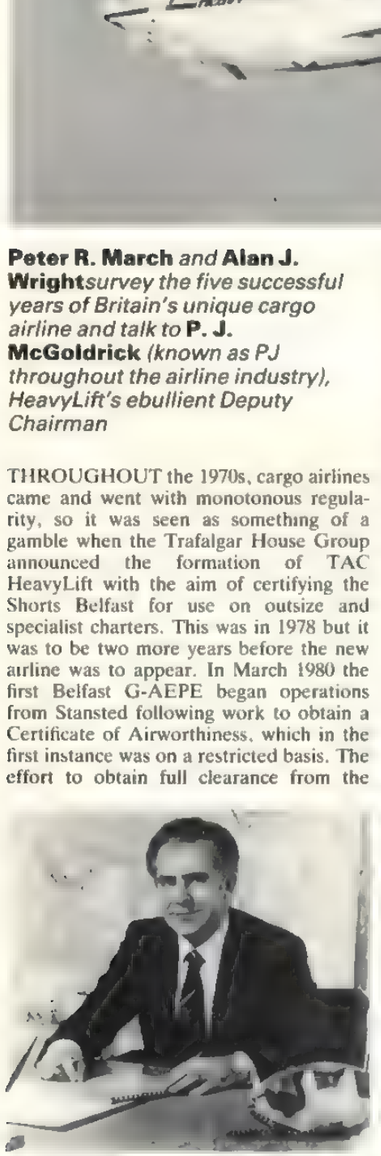
Shorts paid a great deal of attention to detail and comfort when the Belfast was designed and built. The cargo hold walls and roof were completely lined with light blue panels almost to passenger carrying standards. HeavyLift has largely removed this cladding, leaving exposed the many wiring forms running fore and aft. Greater care is needed therefore when loading to avoid damage to the electrical systems, but the disadvantages are far exceeded by the weight saving benefits. After all there is no point in humping unnecessary dead weight around the world when its absence can be replaced by a revenue earning payload.

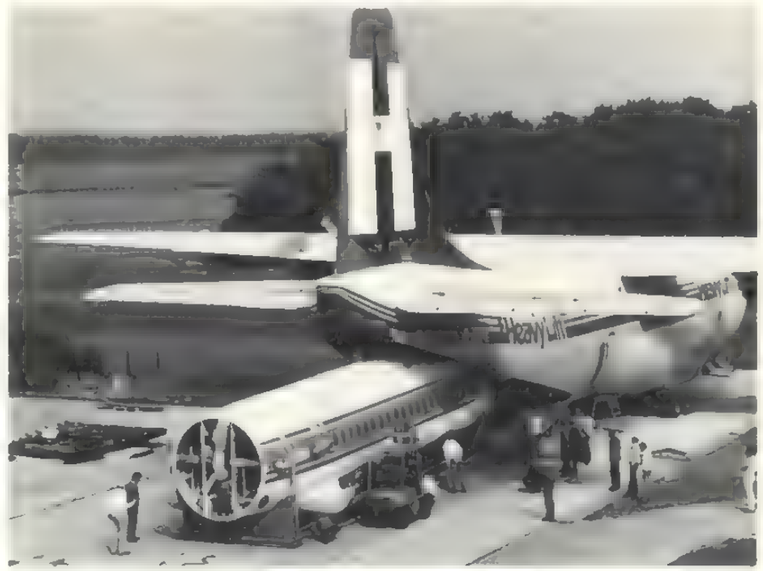
The hold is fully equipped with shackles, ropes, hawsers, etc and the floor can be fitted with roller tracking in configurations dependent upon the type of cargo to be carried. A winch is located at the forward end of the hold, an extremely useful item when loading in remote parts. The equipment carried helps to make the aircraft self-sufficient, even a ladder for the use of the flight engineer when checking oil levels, etc is strapped to the wall. In the event of the aircraft not being scheduled for duty, everything is still neatly stowed and secured in readiness for departure with minimum delay should an urgent charter be received suddenly. On such occasions there is always a crew on stand-by to take on the work.

Above left
A fine study of HeavyLift's Shorts Belfast, G-BEPS, one of three of the type currently flown by the airline. *Photo: S. Piercey*

Below left
P. J. McGoldrick, HeavyLift's Deputy Chairman. *All photos via HeavyLift*

Below
An impressive demonstration of the Belfast's carrying capability. A F28 is being offloaded at Fokker's aircraft repair plant at Woensdrecht.





Above
A Scorpion tracked vehicle enters Belfast G-BEPE at Stansted, en route to the South Atlantic in 1982.

Above right
A Lynx helicopter being winched aboard a Belfast. Westlands has been a regular HeavyLift customer. *Photo: D. Lipson/HeavyLift*

Right
Fiery customer — the first mission for the Belfast Mk 2, G-HLFT, was to bring this huge dragon from Germany for participation in the 1985 Royal Tournament. The aircraft was subsequently named *St George*

When in RAF service, the Belfasts frequently carried a removable stub deck above the forward part of the hold in front of the wing. With seats fitted, personnel accompanying loads could be transported. Although HeavyLift acquired the decks with the aircraft they have been used rarely, the existing seats installed proving adequate for the use of engineering crew travelling with such cargo as an urgently needed replacement engine.

An important member of the crew is the loadmaster who is responsible for receiving and checking the cargo as it arrives for loading. Obviously the positioning and securing is of paramount importance which again is a part of his duty. In flight he also assumes the role of catering officer, dispensing tea and snacks as required.

It does not necessarily follow that a large capacity aircraft has a flightdeck of similar proportions. In the Belfast's case it does. Reminiscent of the palatial quarters Shorts provided on the C Class flying boats of the 1930s, the Sunderland and Stirling, so the transport has a room rather than a cockpit. It really is spacious with the two pilots able to walk between the seats and wall to gain access. The navigator's position is at the rear of the cabin, the occupant travelling backwards. On the starboard side the flight engineer has his panel mounted on the wall and roof. An additional seat is situated in the centre of the deck for the use of a supernumerary crew member, or indeed the load-master. HeavyLift does not in fact carry a navigator on the Belfast nowadays, since the Omega navigation system installed is now cleared for worldwide use.

Entrance to the area is made via a fairly wide staircase, the first flight climbing towards the starboard wall, then after a square half-landing and a 180deg turn, a second flight continues to the upper level.

HeavyLift Heavy-weights
Colour centrespread, overleaf

A fairly regular port of call for HeavyLift's Belfasts is Boeing's facility at Paine Field, Seattle.

Inset left.
HeavyLift's CL-44-0 Guppy departs Stansted. The aircraft is ex-Transmeridian and is registered EI-BND.

Inset right:
Head on, the CL-44-0 takes on an even more unusual appearance.
Photo: D. Lipson/HeavyLift

HeavyLift

Heavy-weights

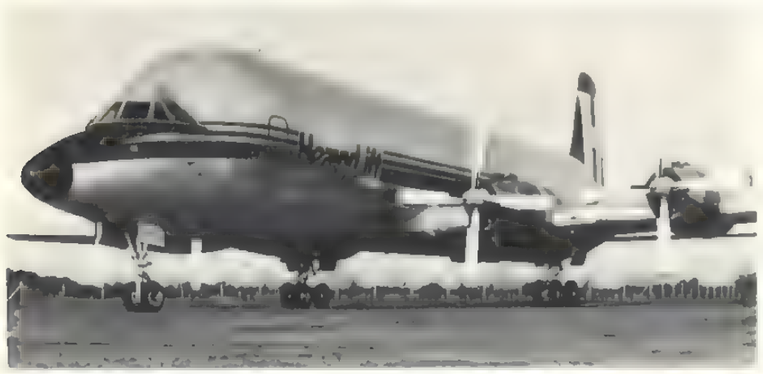
On arrival the galley is to be found directly opposite, which possesses a block of three airliner seats, a generous food preparation work-top, a microwave oven and water boiler. Next door is the rest area originally equipped with four bunks, but HeavyLift has removed one to give more storage space for such useful spares as wheels.

Success for the company was not immediate. It took time to become known, but gradually customers were found, particularly from the aerospace industry. The movement of helicopters around the world has proved a regular source of employment, while the Dutch manufacturer Fokker has discovered the merits of a Belfast to bring back bent Friendships and Fellowships to Holland for repair. It takes two aircraft to ferry one of the jet airliners, but a Belfast can digest a Friendship in one swallow, a far more satisfactory method than by surface transport. The company was also involved in the delivery of the first batch of 767 components from Spain to the Boeing main assembly plant near Seattle.

While HeavyLift's prime role is handling volumetric loads, nevertheless the company is perfectly happy to carry anything, anywhere. During an industrial dispute for instance, the Belfast hauled 32 tons of newspapers to Scotland. There is not a great profit in such activity, but the aircraft does not earn anything sitting on the ground. On this occasion it was due in the north anyway, so the charter paid for what would have been an empty positioning flight. However, it was felt that in order to compete in the more general cargo business, a slightly smaller machine would be a useful addition to the fleet. The ex-Transmeridian one-off Conroy converted CL-44-0, N447T, had been a feature of the Stansted skyline ever since the collapse of its previous owner. Inspections proved it to remain in reasonable shape so it was acquired in mid-1982 and flown to Southend for overhaul. Re-registered EI-BND for convenience, it was soon in service handling loads of all types up to its 25 tons capacity.

Fitting outsize loads into the Belfast or CL-44 is a precise task which cannot be left to approximation or guesswork. Often the clearance between the interior of the aircraft and the sides of a load is just a few centimetres. In the past HeavyLift's planners produced paper cut-outs of the proposed load. These, they manoeuvred over scale drawings of the cargo hold. Unfortunately this method gave no permanent record to show the loaders how the cargo was to be placed inside the plane. Computer technology has now come to the rescue, with HeavyLift using the latest developments in computer graphics. Stored in the computer's memory are scale drawings of each of the aircraft. When a job is being planned an outline of the proposed load is created on a visual display unit (VDU). This is then superimposed on to the cargo hold and the clearances checked. By manipulating a special movement control the planners can also view the load on the screen at all stages of the loading operation. The height of the cargo can be checked in relation to the aircraft's doors, especially as the load moves up the sloping ramp. Since the computer display is accurate to within a millimetre, once the loading operation has been proved on the VDU, the actual task should also work. By linking this computer to a plotter, a permanent record can be made of the load's journey into the hold. Thus everyone associated with the loading procedure can see exactly how the planner intended the cargo to be handled.

Another development which has improved the flexibility of the airline has been the establishment of HeavyLift Engineering at Southend. Originally contracted to BAF Engineering for the initial conversion work, all major aircraft checks and modifications to the fleet are now carried out 'in house'. HeavyLift Engineering also has approval to strip and re-build the Rolls-Royce Tyne powerplants. Staff at the Southend facility have recently been responsible for restoring the ex-RAF Belfast flight simulator which is now used for crew-training purposes. However, the biggest task has been the conversion of a Mk II version of the Belfast, completed in May this year, just in time to make its debut at the Paris Air Show. Registered G-HLFT, this fourth aircraft, has a modified cargo hold which now extends for nearly 90ft and can accommodate an extra 2.5-tonnes of cargo. The extra space has been achieved by the construction of a new cockpit access, the relocation of the galley and alterations to the crew seating arrangements. This lighter Mk II Belfast has replaced one of the older aircraft, in fact the heaviest in the fleet, to maintain three of the type in service. It is possible that a second Mk II conversion will be undertaken



Left
In mid-1982 HeavyLift acquired the unique CL-44-0 Guppy which it uses for more general cargo business of loads up to 25 tons.

Below left
One of the most delicate loads carried by the CL-44-0 Guppy was a consignment of giraffes and antelope. The animals were transported from Mombasa to Newburgh/Stewart, New York and it was to HeavyLift's credit that all survived the flight.

Below
One of two Bell 212 helicopters loading at Stansted for transportation to Brisbane.

Aircraft Illustrated *asked P. J. McGoldrick, HeavyLift's Deputy Chairman, if he could account for the airline's success at a time when so many companies in the industry have failed.*

PJ: 'We quickly established our credibility in the market by doing what we said we could do on time and at the quoted price. HeavyLift is now part of the establishment and recognised by every major aircraft manufacturer in Europe and the United States. One day it dawned on us that we had made it, thanks to the excellent Belfast. We no longer have to justify to people that it works and is reliable. Manufacturers now call us up and feel confident they can use us. This is a big achievement, particularly in the demanding US market.'

How does the Belfast compare with the long established competitors?

PJ: 'In terms of volume it is double the size of the Hercules although the C-130s can go into rough strips — we keep the Belfast to reasonable paved surfaces. The Boeing 747F can beat us in size but is much more restricted as a result — needing bigger loads and more operating facilities. The Belfast is self-contained and is better for 'off-route' operations from manufacturer's and local airports, rather than the major centres and airports. It's interesting too that the CL-440 can carry a greater volumetric weight further than the Hercules for much the same price.'

What are 'typical loads' for the Belfast and how do you make economic operating sense of so much one-off routing?

PJ: 'One straightforward fact — HeavyLift moves more helicopters in its Belfasts than any other operator in the world — everything up to the Chinook in size. 70% of our business is overseas, most of it coming from the aerospace market and also the armed forces. Needless to say the Falklands conflict produced a good deal of business for us in 1982, with the Ministry of Defence contracting us to take aircraft (Harriers and Sea Harriers) and helicopters to the South Atlantic and return with similar, often damaged, loads. For more than three years we were engaged in the Rumanian BAC One-Eleven operation for British Aerospace and the Jaguars to India programme. The space programme is also bringing about new contracts — the first BAe/Eutelsat Olympus is being carried this year, following successful transport of Ariane. The manufacturers are designing their packaging of the satellites and equipment in terms of the Belfast. Wherever possible we try to make return trips with cargo and occasionally it is possible to string together a number of prime moves — for example we recently routed a Belfast from the US to Australia then to Brunei, across to India (empty) and then back to the UK with a load. Our marketing section keeps in contact with the industry and tries to tap into a general cargo market wherever possible.'

Above
HeavyLift Engineering at Southend maintains the company's Belfasts and Cessna 421A, G-AXAW.

Below
This unusual angle on the Belfast highlights the type's wingspan of 158ft 9in (48.42m).
Photo: S. Piercey

How do you see the future of HeavyLift through to the 1990s?

PJ: 'Any business — whether an airline or not — is unlikely to succeed if it doesn't expand to meet the market needs. And this is true, even where the service being offered is already unique. We have expanded our manpower from 60 in 1982 to 75 today, with nine crews (seven Belfast and two CL-440); the fleet has been increased with the introduction of the Mk II Belfast, a Cessna 421A for general communications duties and a corporate SA365N Dauphin helicopter to operate on behalf of the Group. The engineering facility at Southend is extending its operations and means that we are not "held to ransom" by any other company. We are confident that we have as efficient and effective a flying operation as possible. Where our energies must continue to be directed is in terms of marketing — selling our unique product. The market-place is by no means stable so we don't really know what is going to happen next month let alone next year. Nevertheless we are cautiously optimistic. The Belfast has a long operating life ahead of it — we have five aircraft available in total and in keeping just three in service we can fly it well into the next century. We have built a very specialised operation since HeavyLift was launched. The developments in our service to customers in 1985 show quite clearly that we do not intend to have our unique position eroded in the near future nor in the 1990s.'

March past

Frank B. Mormillo

ALTHOUGH it may seem paradoxical, it is a fact that one of the least known air museums in the US has the potential to become one of the most important in the world. Located at March AFB, Ca headquarters of the 15th Air Force, the March Field Museum was organised under the inspiration of the US Air Force Heritage Program which, among other things, encouraged the creation of museums at various Air Force bases.

After the March Field Museum was formally dedicated on 19 December 1979, the US Air Force decided to organise its museum programme a bit more thoroughly and designated three categories for its base museums. Category 'A', which only applies to the museum at Wright-Patterson AFB, Oh (the US Air Force's only official museum), indicates that the collection is partially funded by the Department of Defense and that there is no limit to the scope of its aircraft collection. Category 'B' museums, which currently applies only to that at Eglin AFB, Fl must show their own financial viability; however, they can ask for civil service positions for staffing and their collections can be Air Force-wide in scope. Except for the collections at Wright-Patterson and Eglin, all of the other museums in the US Air Force come under Category 'C' and must rely on civilian foundations for fund raising; the service provides the facilities, utilities and very limited staffing for museums in this category. In addition, the aircraft collections in Category 'C' museums are restricted in scope to depict only those types that actually served at those particular bases or with units that have been or are currently assigned to those bases.

Above right
The entrance to the March Field Museum with a Republic F-84F Thunderstreak displayed in front. *All photos by the author*

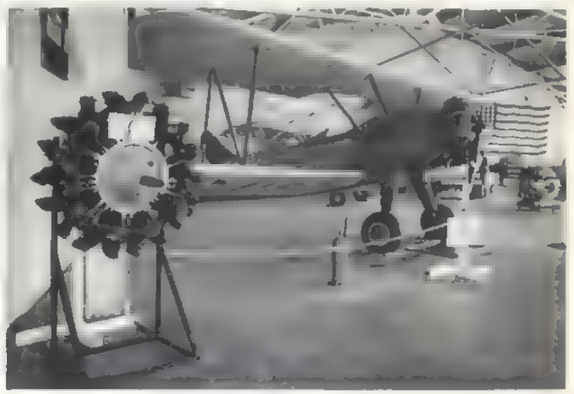
Left.
***Blonde Bomber*, the March Field Museum's B-25 Mitchell, is displayed on the base flightline together with the B-26, the B-17 and the B-24. Note the operational KC-135 tankers and C-130 transports in the distance.**

Below
A detailed scale model of a Curtiss JN4 trainer, one of the first aircraft based at March Field, on display in the museum building.

Below right
An interior view of the March Field Museum building showing a Continental W-670-M engine and a Boeing PT-13D Kaydet trainer on display.

Technically, a part of the March Field Museum collection — which includes 29 aircraft and missiles belonging to the museum and three others on loan from other collections — is in violation of the scope of Category 'C'. That came about because the museum was founded before the new regulations limiting and defining the scope of the collections, came into effect. When the March Field Museum was founded, Lt-Gen James P. Mullins, who was 15th AF commander at that time, encouraged the idea of displaying one of every type of aircraft in the collection. Although many of the aircraft currently in the museum were originally flown in to March AFB for display, they are no longer airworthy and, because it is not very practical to move them elsewhere now, they will all (including those types which have no historic connections to the base or its units) probably remain at March AFB.

The full-time staff of the March Field Museum consists of one man — Maj Michael A. Freitas, its director. For assistance, Freitas generally has individual airmen detailed to him — one at a time — for six-week periods and relies heavily on a force of civilian volunteers. Although he reports that 'We never have enough



Above.
The March Field Museum's B-17 Flying Fortress, named *2nd Patches*, is believed to have once been used as a transport by Gen Ira Eaker.

Below:
The museum's B-29 Superfortress is displayed in Korean War markings. The aircraft was named *Mission Inn* in honour of a Riverside hotel that is now a state historical landmark.

Bottom:
A former Vermont ANG EB-57E Canberra framed by the tail of an ex-Iowa ANG F-89J Scorpion on the March AFB flightline.

volunteers with the right kinds of expertise,' Freitas is currently working wonders with 28 volunteers who individually devote from four hours per month to three days per week on museum projects. A former KC-135 and OV-10 pilot who is now grounded for medical reasons, Freitas has been the museum director for two years. However, before assuming the directorship of the museum, he worked at 15th AF headquarters and was involved in the founding of all 11 museums in the command. Although he misses active duty flying, Freitas said: 'The thing that I'm best at is museum work; I like what I'm doing. I can look around and say that I've made these accomplishments. All that I've done at 15th AF headquarters — all the papers I've pushed — will be forgotten; but, this will be remembered.'

If current plans come to fruition — and there's no reason to doubt that they won't — the future of the March Field Museum will probably be much brighter than originally envisaged back in 1979. In April 1985, tentative plans were announced by Maj Freitas, the March Field Museum Foundation and Ab Brown, the mayor of Riverside, for a dramatic expansion programme that could eventually make the March Field Museum 'The Air Force Museum of the West'. Presently, its collection of aircraft and memorabilia is housed in a 28,000sq ft display building, that was once the commissariat, and on the base's active flightline. While both the building and flightline display area are in the middle of the base, they are accessible to the public every day of the week. The museum is open from 10.00hrs until 14.00hrs, Monday to Friday and from noon until 16.00hrs on Saturday and Sunday, with the facilities being closed on holidays. Museum visitors simply have to go to the main gate at the base to obtain vehicle passes that will allow them to drive to the building; bus tours carrying visitors to see the larger aircraft on the flightline depart from the museum building at 13.00hrs each day.

'Hardly anybody knows about us right now,' said Freitas. Therefore, a new sign is being posted by the freeway next to the base (Interstate 215) to help make the facility better known. Within a year, plans call for the larger aircraft on the flightline display to be moved to a 35-acre display area near the side of the base that is adjacent to the freeway and more directly accessible to the public. Within two years, a small starter building will be constructed on the site to house the smaller aircraft, a gift shop, a theatre, offices, etc and, within five years, a 200,000sq ft building will be constructed to house the bulk of the collection. After the larger building is constructed, the starter building will become a workshop.

The entire cost of the move and expansion will be financed through a fund raising campaign by the foundation. Freitas estimates that it will take about $20,000 to move the aircraft and landscape the area

for the first phase of the operation. The starter building will probably cost up to $1million and the larger building will cost $6-8million. Maj Freitas and Mayor Brown both think that the museum will eventually have 'a tremendous economic impact' on the Riverside area. Presently, about 30,000 people visit the museum each year. However, Freitas expects that number to increase dramatically once the facility becomes better known and is more accessible to the public. According to him, the Air Force Museum at Wright-Patterson AFB has about one million visitors and brings about $26million to Dayton each year. 'Realistically, with the climate there, their season is only about six months out of the year,' he said. Because of Riverside's climate, location, accessibility and the large population of Southern California, Freitas thinks that the March Field Museum could eventually attract two million visitors a year!

The present museum building houses a small number of aircraft, engines, vehicles and training devices in addition to a large uniform, photo, art and model aircraft collection, a gift shop, a library, a theatre and the museum offices. The aircraft displayed inside the building are a Boeing PT-13 Kaydet, a Fairchild PT-19 Cornell, a Stinson L-5 Sentinel and a Vultec BT-13 Valiant. A Bell P-59 Airacomet is also scheduled to be placed inside the building after it is restored to display condition. Located in a lot immediately adjacent to the museum building are a Bell UH-1F Iroquois, a Cessna O-2B Skymaster, a Consolidated Titan I ICBM, a McDonnell F-101B Voodoo, a North American AT-6 Texan, a North American F-86H Sabre, a Republic F-84C Thunderjet, a Republic F-84F Thunderstreak, a Republic F-105B Thunderchief, a Republic F-105D Thunderchief and a Vultee BT-13 that had been converted to resemble a Japanese Val dive bomber for the movie *Tora, Tora, Tora*.

Museum aircraft displayed on the March AFB flightline include a Beechcraft C-45 Expediter, a Boeing B-17 Flying Fortress, a Boeing B-29 Superfortress, a Boeing B-52D Stratofortress, a Boeing KC-97 Stratofreighter, a Consolidated B-24J Liberator, a Curtiss P-40E Kittyhawk, a Douglas B-26 Invader, a Fairchild C-123 Provider, a Grumman SA-16 Albatross, a Lockheed U-2D, a Lockheed C-60 Lodestar, a Martin EB-57E Canberra, a North American F-100D Super Sabre, a North American B-25 Mitchell, a Northrop F-89J Scorpion and a Northrop A-9A. The museum is also scheduled to obtain a North American T-39 Sabreliner in the summer of 1985 and a McDonnell-Douglas F-4C Phantom II in the near future.

The B-17 in the museum's collection has a particularly interesting background. It came to the museum from Bolivia where it had been used as a freighter to carry cargos of meat. Said to have been the personal transport of Gen Ira Eaker during WW2, this particular Flying Fortress was actually made up from two different B-17s and there is some confusion about its true serial number.

Actually, except for the P-40, the B-24 and the *Tora, Tora, Tora* Val, all of the aircraft and exhibits at March AFB belong to the Air Force Museum at Wright-Patterson AFB which holds title to all Air Force base museum aircraft. All of the Category 'B' and 'C' museums in the Air Force get their exhibits through the Air Force Museum and keep a 'want list' on file at Wright-Patterson. The P-40 and the B-24 at March AFB are on loan from Dave Tallichet, who maintains a private aircraft collection at several locations under the title 'Yesterday's Air Force'. The *Tora, Tora, Tora* Val is on loan from the Marine Corps Museum at Quantico, Virginia and is scheduled to return there in the near future.

According to Maj Freitas, some measure of the March Field Museum's rising importance can be gained from the fact that, for the first time ever, the Air Force Museum conducted its annual workshop for museum curators, workers, foundation members and volunteers away from Wright-Patterson AFB — it was held at March AFB on 2-5 April.

With a solid beginning to build upon, a dedicated volunteer foundation and a good plan for the future, the March Field Museum has every chance of becoming one of the world's leading aviation museums.

Acknowledgement: The author would like to express his appreciation to Maj Michael A. Freitas and Catherin Rubin for their assistance with this article.

Above right:
An O-2B Skymaster and an F-101B Voodoo on display at the March Field Museum. A UH-1F Iroquois is barely visible between the two aircraft. The F-101 came from the New York Air National Guard and the O-2 came from the 196th TASS (California ANG) which now operates F-4C Phantoms at March AFB as the 196th TFS.

Right:
The March Field Museum's Northrop A-9A was one of two such attack planes that were built to compete for the contract that was eventually won by the Fairchild-Republic A-10 Thunderbolt.

The BAe 146 in service

Two years on—Part 2

R. A. Nicholls *concludes his feature on the 146 in service, as seen in the light of the events and experience of the past two years*

EARLY 1984 saw further British Aerospace 146 srs 200s delivered to Air Wisconsin, whose operation was described last month, and a single 146 srs 100 to another US carrier, Alaska-based Air Pac.

Air Pac provides regional services within the Aleutian Islands and the mainland State of Alaska, and the acquisition of aircraft 1013, registered N146AP, enabled the airline to introduce the first jet service between Anchorage and the island of Dutch Harbor. As well as passengers of the human species, AirPac's 146 srs 100 also ships out the succulent king crabs on which the economy of Dutch Harbor largely depends, using an unsealed 3,900ft cross-wind strip. The 146's responsive handling, low approach speed, rapid lift dumping through spoilers, and sturdy wide-track landing gear are all very relevant to this operation, and the aircraft is reported to be performing to expectation in all respects.

The largest single order for the 146 came from Pacific Southwest Airlines (PSA) of San Diego, Ca which placed a firm order for 20 srs 200s and took options on a further 25. The £300million order was announced in November 1983, and in April 1984 the second pre-production 146 srs 100, aircraft 1002, was loaned to the airline for two months of route proving and crew training after it had completed a wide-ranging demonstration tour of the US.

Aircraft 1002, appropriately registered G-OPSA, was perfectly suitable for type conversion of PSA's 64 nominated flight-deck crews since, although it is a srs 100 variant, its handling and performance characteristics are extremely similar to those of the srs 200. Conversion went very smoothly and the PSA crews quickly became competent on the 146, the exercise being completed in an average time of under 10 flying hours per crew.

The first PSA 146 srs 200 was delivered on 30 May 1984, since which time PSA srs 200 airframes have been the dominant feature on the Hatfield final assembly track. No aircraft were delivered between July and November 1984 owing to industrial action at BAe's Filton plant, which produces the centre fuselage section; deliveries returned to normal at the end of the year, but to make up for some of the delay 1002 was placed on the US register as N5828B and leased to PSA for five months from October.

The PSA order was important not only for the numbers involved, but also because it represented the first instance of an airline 'trading-down' from a larger aircraft, in this case the Boeing 727. Two major factors affecting the airline's choice of the 146 were its low noise levels and low aircraft-mile costs, the latter enabling it to make money on passenger loads which are unprofitable with the Boeing 727.

PSA operates an extensive route network within California, and provides links with the States of Arizona, Nevada, New Mexico and Washington. Many of the airports served are very environmentally aware, particularly those in the Los Angeles-San Francisco area, and the 146 made a lasting impression during noise measurements at Burbank when it registered only 89.3 EPNdB against typical figures of 96.3 for a DC-9 srs 80 and 112.7 for a 727. Comparison of noise patterns showed the 90 EPNdB footprint of the 146 to cover 2.0sq miles, against 3.5 for the DC-9 srs 80.

The 146's low aircraft-mile cost dramatically undercuts PSA's existing fleet, so much so that on a typical PSA sector the break-even passenger loads for Boeing 727, DC-9 srs 80 and 146 srs 200 are 50, 35 and 25 passengers respectively. A major factor in the aircraft-mile cost equation is the 146's fuel burn of around 600 US gallons per hour, against some 1,500 for the Boeing 727. For PSA, as for Air Wisconsin in the north, aircraft-mile costs are of greater importance than seat-mile costs, since providing the service frequency demanded by the customers inevitably means acceptance of low load factors on some schedules; 45 passengers on a Boeing 727 are a liability, while the same number on a 146 represents a substantial profit.

PSA is gradually retiring 727s as its 146 srs 200s are delivered, and its fleet will eventually consist only of DC-9 srs 80s and 146 srs 200s. The airline's broad aim is to employ the DC-9 srs 80s on the peak services, where they can operate profitably, while the 146 srs 200s will cover those with lower load factors. The 146 will also enable PSA to increase frequency on existing routes and expand into new markets.

In early-1985 the 146 became the first jet airliner to meet the 89.5 EPNdB noise limit imposed at John Wayne Airport, Orange County, Ca without reduction of payload. The practical advantage for PSA is that the airport authorities will permit two 146 movements for every one by a type which exceeds the 89.5 EPNdB limit; the carrier can therefore substitute two 146 schedules for one DC-9 srs 80. While competitor AirCal's Boeing 737s are having to reduce passenger and/or fuel loads in order to meet the limit, PSA's 146s can depart from John Wayne with a full passenger load and fuel for a 1,200nm sector, plus standard reserves, and still stay comfortably within the noise limit. The competitive edge which the 146 gives PSA over the competition is self-evident.

As with Air Wisconsin, PSA cabins are configured with 100 seats, six-abreast with a centre aisle, and passenger reaction has been very favourable indeed. A consumer survey carried out among PSA passengers revealed that 92% liked the 146, 6% had no strong views either for or against, and only 2% preferred the older jets which it was replacing.

The PSA 146 fleet is steadily increasing, with the twelth aircraft having been delivered in mid-August, and the airline is confident that it will eventually have a definite requirement for all the 45 aircraft either ordered or on option.

Yet another US customer is Aspen Airways, which operates a fleet of Convair CV-580 turboprop twins within Colorado and the surrounding states. One of Aspen's main routes is from its Denver base to the Rocky Mountains ski resort of Aspen, which is served by Pitkin County Airport, situated 7,815ft ASL. Aspen selected the 146 srs 100 as the only jet able to provide reliable year-round service into Pitkin, and placed an order for two aircraft. The first, N461AP, was delivered in December 1984 and the second followed this year.

N461AP is based at Lubbock, Tx from where it flies an early morning business schedule to Denver via Amarillo. During the day it flies five round trips between Denver and Pitkin County Airport, carrying mainly leisure traffic, before returning to Lubbock via Amarillo in the evening. Aspen intends to extend its route network with the second 146 srs 100, and is looking at a number of possible destinations following the collapse last year of Denver-based Frontier Horizon. Though not officially holding any options, Aspen has expressed a keen interest in increasing its 146 fleet at an appropriate time in the future.

The first order from the potentially lucrative Far Eastern market was placed by Airlines of Western Australia, since renamed Ansett Airlines of Western Australia to reflect its status as a subsidiary of Ansett Transport Industries of Australia. The airline ordered two 146 srs 200s, both of which had been delivered by mid-1985

The Ansett aircraft have spacious cabins, seating 75 passengers in considerable comfort and with three galley units instead of the standard two. By offering a superior standard of passenger comfort the airline is aiming to capture the up-market business travel on regional services based on Perth, Western Australia. It is understood that the 146 srs 200 will also be evaluated with a view to the type's use on other routes within the Ansett network, and follow-on orders are thought to be a distinct possibility in due course.

During 1984 BAe took the 146 srs 100 demonstrator on an extensive sales tour of China, a country with which Hatfield has had a long business and product support relationship following the sale of 35 Tridents to the national airline, Civil Aviation Administration of China (CAAC), during the period 1971-78. Two weeks of demonstrations at various locations on CAAC's route network, particularly those which are at high altitude and figure in the airline's short-medium haul services, gave the Chinese a very good impression of the aircraft and its capabilities.

During the visit to China by a British trade mission in March this year, a Memorandum of Understanding was signed between BAe and the China Aviation Supplies Corporation. The Memorandum covers the purchase of 10 BAe 146 srs 100s for service with CAAC, with deliveries commencing in June 1986. This is seen as an initial order, and it is likely that the quantity will be increased at a later date.

The 1985 Paris Air Show saw another 146 ordered for VIP use. Following the selection of the 146 srs 100 by the Government of the Mali Republic and the RAF's Queen's Flight, a single 146 srs 200 was ordered by the Indonesian Government for transporting the President and other senior officials. The Indonesian 146 srs 200 will be operated on behalf of the Government by Pelita Air Service and will

Left:
The BAe146 srs 100 is the only jet airliner capable of serving Dutch Harbor, where AirPac's N146AP is seen on final approach to the unsealed 3,900ft strip, with flaps fully down and petal airbrakes open.
All photos: BAe Hatfield

Above left:
San Diego-based PSA has 12 BAe146 srs 200s in service, eight more on order and holds options on a further 25. The airline is retiring Boeing 727s as 146s are delivered.

Above right:
Aspen Airways uses two 146 srs 100s and has talked in terms of building up to eight. This striking photograph of N461AP shows to advantage the shoulder-mounted wing of the 146.

The BAe 146 in service

be based at the Indonesian capital, Jakarta.

The appeal of the 146 srs 200 in the intensely competitive US market was demonstrated again in early-September of this year with the announcement of a firm order for eight aircraft, plus two options, from Honolulu-based Hawaiian Airlines. The 146s will, it is understood, be fitted-out with 100-seat cabins, and will replace DC-9s and MD-80s in the Hawaiian Airlines fleet. The replacement of these existing aircraft, which are by no means nearing the end of their useful lives, with the 146 would appear to suggest a change of marketing strategy by the airline, and it is probable that Hawaiian is planning to increase frequency on its routes between the prosperous volcanic islands which comprise the 50th state of the US.

BAe has achieved a major success in securing the Hawaiian order, which was won in the face of stiff competition from the airline's current supplier, McDonnell-Douglas, which was offering the DC-9's younger brother, the MD-87. 146 srs 200 deliveries to Hawaiian are due to commence in November 1986.

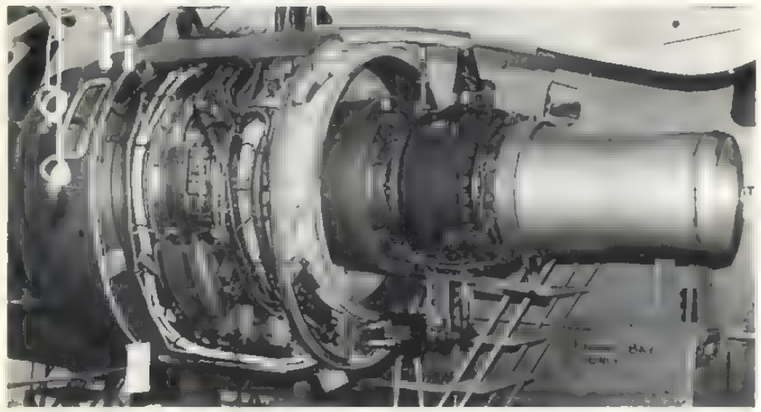
The past two years have also seen a number of interesting developments get under way in the 146 programme. Whereas the 146 srs 100 and srs 200 were initially powered by the 6,700lb st ALF502R-3 and 6,970lb ALF502R-5 turbofans respectively, the latter is now standard equipment on both models. One result is that the srs 100's certificated weights have been increased in line with the increased engine power available; MTOW, for example, is now 82,250lb against the original 76,000lb. A simple set of uprating modifications is available to bring the ALF502R-3 up almost to R-5 standards, the engine thus becoming an R-3A — Aspen's first 146 srs 100 was delivered with R-3As, but some earlier aircraft still have straight R-3s.

Carbon-fibre brakes have been undergoing in-service trials on one of Dan-Air's 146 srs 100s, and have also been fitted to aircraft 1001 (G-SSSH) and 2008 (G-WAUS), the latter two being development aircraft retained at Hatfield by BAe. Though appreciably more expensive than the standard units, the carbon-fibre brakes offer a longer life and save some 250lb structure weight, so they may well become a standard option in due course.

One of BAe's development aircraft is now flying with FADEC (full-authority digital engine control), a system which promises to reduce operating costs by ensuring optimum fuel efficiency under all operating conditions. The FADEC feature may in time be offered as standard or optional equipment on the 146 srs 100 and srs 200, but it is primarily intended for the next generation, the 146 srs 300.

The 146 srs 300, which will carry 130 passengers at 29in pitch or 122 at 32in, is being developed in response to clear feedback from several of the larger airlines that they see the need for a 120-seat aircraft with the economics and low noise levels of the 146 family to handle the bottom end of their markets. The srs 300 will be some 10ft longer than the srs 200, this being achieved by inserting 'plugs' in the fuselage centre-section, and will be powered by an uprated version of the ALF502, the 7,500lb st R-7. Despite modifications to increase thrust by some 8% the R-7 will give the srs 300 an overall fuel burn almost identical to that of the srs 200, while the payload will be some 20% higher; aircraft-mile operating costs will thus be unchanged, while seat-mile costs will fall appreciably.

The 146 srs 300 is aimed at the top end of



Top left
VH-JJP (aircraft 2037) and VH-JJQ (2038) are both in service with Ansett WA, operating schedules based on Perth, Western Australia. Both were delivered in the first half of 1985.

Centre left
Aircraft 1002 at Lhasa, Tibet, during the 1984 demonstration tour of China, when it visited 13 cities in 12 provinces. BAe146s will soon be a familiar sight at this high and remote airport.

Left.
Standard powerplant on the 146 srs 100 and srs 200 is the modular 6,970lb st Avco Lycoming ALF502R-5 turbofan. To date the engine has performed well in service and proved very reliable and efficient.

Right
Artist's impression of the 'stretched' 146 srs 300. Carrying up to 130 passengers, the variant will commend the 146 concept to a whole new range of potential operators and would be in service by 1988. Note the drag-reducing 'winglets'.

the regional market and at IT traffic, and will offer considerable flexibility in operation. Although economical on short/medium haul scheduled routes, it will also be able to handle single-sector IT charters from, for example, the UK to the eastern Mediterranean.

One radical departure on the 146 srs 300 is the option of cockpit CRT displays to replace the conventional electro-mechanical instrumentation of the two earlier models. The reliability and cost advantages of CRT displays have now been proved, and a six-tube display of primary flight information will be offered on the 146 srs 300, probably feeding back to the srs 100 and srs 200. Those conservative customers who opt for conventional instrumentation will, however, find the srs 300 cockpit fully compatible with the earlier models, permitting simple cross-qualification of pilots. Much preliminary work has been carried out on the 146 srs 300 and the aircraft could be in service by 1988, provided orders materialise as expected. While no firm orders have been announced at the time of writing, it is understood that BAe holds a letter of intent covering at least one significant order for this model.

The other major development is the freighter version of the 146 srs 200, which again is the result of a clear demand on the part of several operators. With a rear-fuselage freight door, the srs 200 freighter will carry six standard cargo pallets to a maximum weight of 10 tonnes, increasing to 13 tonnes if the structural strengthening of the srs 300 is incorporated in the srs 200. The 146 srs 200 freighter will avoid the night curfews enforced against jets at many airports, and round-the-clock operation is a key factor in the air cargo business. Subject to firm orders being received, the srs 200 freighter could be in service by the end of 1986.

BAe is well pleased with 146 sales to date, 61 firm orders being considered quite respectable in the present world economic climate. In addition to firm sales, somewhat more than 35 options are held on the 146 srs 100 and srs 200, but not all of these have been officially announced owing to commercial considerations on the part of the customer airlines. To break even BAe must sell some 250-300 aircraft, and it is increasingly confident of achieving this within the projected development and production life of the 146.

When the 146 was re-launched in 1978, BAe saw the srs 100 as the big seller, with the srs 200 appealing to a more limited market. In the event various economic factors, particularly deregulation in the US, have turned that assessment on its head; the srs 200 is now unquestionably the mainstay of the programme, while the srs 100 is seen as a slow but steady seller. The modular system of construction employed in the 146, with all modules except one being common to both variants, allows for rapid changes of balance within the build programme and BAe was able to tune production to suit the market. Construction is currently authorised up to the 95th aircraft, while long lead-time items are being ordered to cover production beyond that figure.

The 146 has now proved itself technically, albeit with inevitable teething troubles at the outset, while on economics and performance it has in many particulars exceeded BAe's claims. The design concept of replacing two turboprops with four turbofans has been vindicated on grounds of both cost and performance, though many interested parties had serious reservations until they actually saw it working out in practice.

Everything now points to the long-term success of the 146, and it is very noticeable that the prophets of doom, so critical of the project just a few short years ago, have fallen strangely silent of late.

Table 1:
BAe146 Leading Particulars

	srs 100	srs 200	srs 300
Wing span	86ft 5in	86ft 5in	86ft 5in
Overall length	85ft 10in	93ft 8in	104ft 2in
Height	28ft 3in	28ft 3in	28ft 1in
Powerplant (Avco Lycoming)	ALF502R-5	ALF502R-5	ALF502R-7
Take-off thrust (lb)	6,970	6,970	7,500
By-pass ratio	5.7 : 1	5.7 : 1	5.2 : 1
Fuel capacity (standard — Imp gal)	2,580	2,580	2,838
Fuel capacity (optional — Imp gal)	2,838	2,838	na
Max take-off weight (lb)	82,250	89,500	100,000
Max landing weight (lb)	73,350	77,500	90,000
Max zero fuel weight	66,000	71,000	83,000
Typical operating weight empty (lb)	47,700	49,300	54,500
Passenger capacity (standard)	82 at 33in	100 at 33in	122 at 32in
Passenger capacity (maximum)	93 at 29in	111 at 29in	130 at 29in
Freight hold volume (cu ft)	478	645	860
Typical cruising speed (kts IAS)	425	425	425
Design Vmo (kts IAS)	300	295	295
Design Mmo (Mach No)	0.7	0.7	0.7
Flight crew	2	2	2
Cabin crew	2/3	2/3	3

Table 2:
BAe146 Firm Sales and Orders — Correct to October 1985

Operator Details	*146 srs 100*	*146 srs 200*
AirPac	1	—
Air Wisconsin	—	8
Ansett WA	—	2
Aspen Airways	2	—
CAAC	10	—
Dan-Air	4*	—
Hawaiian Airlines	—	8
Indonesian Government (Pelita Air Service)	1	1
Mali Republic	1	—
Pacific Southwest Airlines (PSA)	—	20
RAF (146 Evaluation Flight)	2*	—
RAF (Queen's Flight)	2	—
TABA	2	—
Total sold or on order	24*	39

* Aircraft 1004 and 1005 are shown under both RAF (146 Evaluation Flight) and subsequent owner Dan-Air. Net figure for srs 100 is thus 22.

Note: Aircraft 1001, 1002, 1003 and 2008 are retained by BAe for test, development and demonstration purposes, and do not figure in the above table.

RAF in the Falklands (Part 2)

Mount Pleasant Airfield

Brian Goulding continues his account on the RAF in the Falklands, with a look at the Hercules Flight and the new Mount Pleasant Airfield

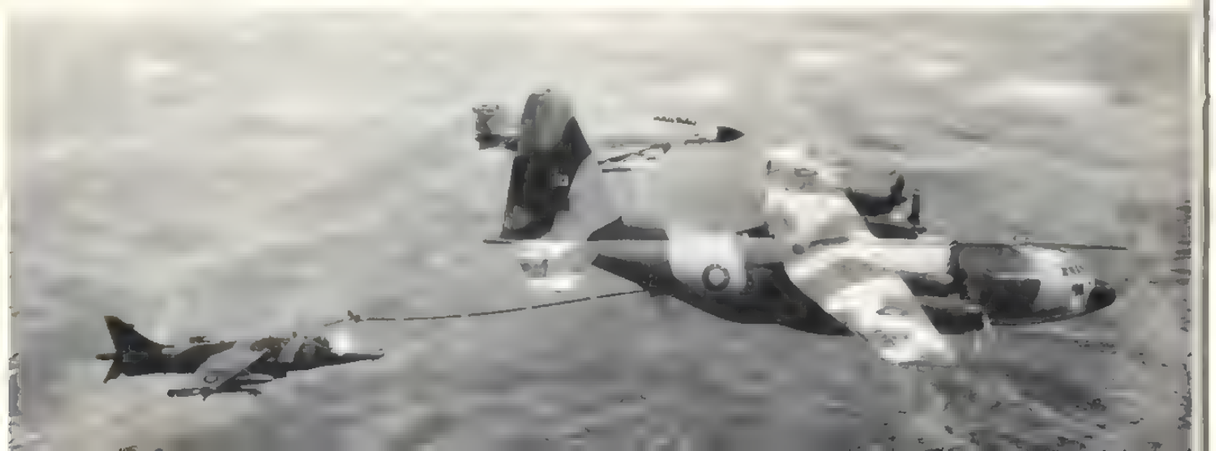
Above:
An aerial view of Mount Pleasant Airfield seen in early-1985 when the main 8,500ft runway was nearing completion; the path of the 5,000ft cross runway can be discerned centre right. The first divot was cut on 31 December 1983 and the first landing took place only 16 months later. *Photo: MoD*

Hercules: 1312 Flt

THE author was to spend two fascinating days with the 'Hercdet', or 'Alberts.' The unit was manned by a mixture of Nos 24 and 30 Squadron crews, who share all duties, whether tanking, maritime patrols, fighter affiliation, supply/support (including of units on South Georgia). The aircraft complement is of modest size, tanker and freighter, with equal numbers of aircraft and crews. The Airbridge C-130 and its crew can also be called upon by the detachment in emergency when at the Stanley end. One aircraft and crew is permanently on QRA when not flying other tasks. There are no regular crews made up on the parent squadrons while operating from their home base at Lyneham, but at Stanley, each crew stays together throughout the four month tour.

The crews work a 20 day cycle, then one day off, flying two, three, and sometimes more sorties daily (plus doing QRA duty), averaging 80/90 flying hours per month. It is intensive and demanding. There are no 'spare bods' to replace ailing crewmen, who even fly with colds, within reason. These men are certainly not playing at it, and responsibilities are taken very seriously by everyone involved. The same can be said of the groundcrews, too, who have no spare capacity. The rate of serviceability is exemplary, and this applies to all types of aircraft, not only the Hercules. There are no hangars large enough to take the 'Hercs', so all servicing is done in the open on the exposed apron, sometimes in ferocious winds, rain, and snow.

Below:
Over typical Falklands terrain — Hercules C1K XV213 of 1312 Flight refuels a Harrier GR3 of 1453 Flight (since disbanded), while a Phantom FGR2 of No 23 Squadron looks on. *Photo: RAF Stanley*



Left
'There is no public transport on the islands other than the Islanders of FIGAS (Falkland Islands Government Air Service) which fly a regular schedule round the settlements.' Maintenance being carried out on the FIGAS Islander in the old hangar at Stanley.
Photo: A. J. Goulding

Below.
Refuelling scenes — viewed from the small hose outlet of the Hercules C1K, a Sidewinder-equipped Phantom of No 23 Squadron replenishes its tanks . . .

Bottom:
. . . and a Harrier GR3 follows suit.
Photos: Brian Goulding

Air and groundcrew seem to have a particularly close rapport, and the latter get to fly if they wish, duty rosters permitting. Not all the groundcrew are directly off Hercules squadrons. One flight systems technician to whom I spoke was based at Valley on Hawks. He'd been on Hercules 10 years ago, and had undergone a two week refresher course at Lyneham before coming to Stanley.

A first-hand look at the 'Hercs' duties in the Falklands was given by two sorties — a maritime patrol, and a tanking mission, both with Flt Lt Bill Akister and crew. For the morning MR sortie, 'check-in' at the crew room (which carries the sign 'The Albert Hall') was at 09.00hrs. As usual I had thumbed a lift up to the airfield from Stanley, this time in an army Bedford. There is no public transport on the islands other than the Islanders of FIGAS (Falkland Islands Government Air Service) which fly a regular schedule round the settlements. One is therefore wholly reliant on service and contractors vehicles. Giving of lifts is an unwritten rule, and at no time did I have to wait more than a couple of minutes to be picked up.

For the MR sortie, there was no formal briefing. The crew had done it many times before. Flt Lt Bill Akister was obviously a very senior pilot; co pilot was Flg Off Paul Oborn, a New Zealander in the RAF; nav-Flt Lt Ian Shields, who I had met previously on a Vulcan squadron; flight engineer — Flg Sgt Dave Dodd; and air loadmaster — Sgt Sam McDonagh who had remustered fairly recently from the RAF Regiment. The task was to patrol the exclusion zones, midway between the partial and total circles of 75 and 150 miles respectively, taking the aircraft to within 120 miles of the tip of Argentina.

At just gone 10.00hrs, XV203 lifted-off on a scheduled 3½ hour flight round the Islands, generally at 800ft, changing course 10deg every 10min or so on our 'great circle'. A close watch is kept on the small radar screens of pilot and navigator, the standard Echo 290 set, but which has proved itself very useful for picking up even the smallest of vessels. Any shipping contacts are closely scrutinised from very low-level, logged, reported, and any strangers photographed by the loadmaster using a Canon AE1 out of the cockpit side windows. Weather reports are also passed at regular intervals.

The first checkpoint was Beauchene Island some 40 miles south of The Falklands, within reach of small boats or helicopters from the South American mainland, so it is visually surveyed very thoroughly from extremely low-level, keeping a wary eye open for birds which are an ever-present hazard. No sign of life other than the wild variety, the single hut on the island being carefully checked out before course was resumed. It was very quiet, with no contacts, so I was permitted to try my hand at flying the Hercules in the captain's seat with Bill keeping a watchful eye from behind. With its powered controls, and instant response, it felt little different from the light twins, such as Seminole or Bonanza, and is a delight to handle.

Down at 800ft, above a fairly heavy sea, and some low cloud about, it was unusually quiet, with no contacts on radar for half an hour. What had happened to the foreign fishing fleets normally to be found? (Russian, Polish, Chinese, Japanese, Spanish). The weather was improving as XV203 ploughed on when, suddenly, the captain spotted a contrail, above and well to the west. He obviously considered it unusual enough to report instantly. Seldom have I seen the calm of a flight deck changed so rapidly as certain orders were received, and the aircraft's task was altered

Above.
The author (left) with Flt Lt Bill Akister (centre) and co-pilot Flg Off Paul Oborn after a MR sortie in Hercules XV203 of 1312 Flight.

Above right:
The 40-mile journey from Stanley to the new Mount Pleasant Airfield took several hours. Part of it was across country and several times the Mercedes 'CV' had to come to the aid of the Land Rover.

Right:
Final Approach to Mount Pleasant Airfield on the inaugural flight on 1 May 1985. The photograph was taken from the flightdeck of RAF TriStar ZD952 of No 216 Squadron.
Photo: Sqn Ldr M. J. Cawsey

to that of reserve tanker. I had examined the large grey fuel tanks in the hold as we boarded the aircraft, 27,000lb of fuel always available for contingencies. And this was to be one of them, it seemed!

The atmosphere on the flightdeck was intense. Several times I was asked to unplug my headset, as there were obviously things coming over the air I should not hear. But it was certainly a 'panic', and a big one at that, judging by the urgency with which we were ordered to change course, and climb to our allotted tow line position. It was known that an Argentine naval exercise had taken its forces close to the exclusion zone boundary, and that certain probing tactics might be tried; but whatever it was, it had been too close for comfort and had apparently justified a full scale scramble, about which the station was abuzz for a couple of days.

After half an hour or so we were released, calm returned, and the seemingly more mundane MR task was resumed. There was much more shipping traffic now to be seen, mainly large fishing vessels; a Chinese freighter; a huge, red Nassau-registered drilling ship — Penrod 96; all of which were logged and photographed. Further round was a RN frigate with two Wasps operating nearby.

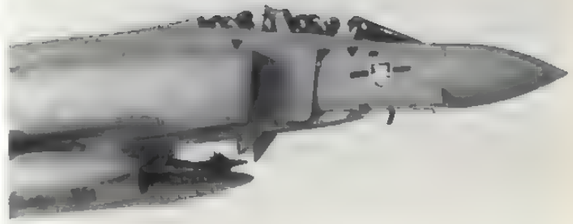
The cloud was thickening as XV203 completed a circuit of The Falklands, and it was fairly turbulent as co-pilot Paul Oborn brought the Hercules in to land smoothly in a gusty 25/30kts crosswind, pulling up with plenty to spare on what had looked a disconcertingly short runway on final approach.

The next day, same crew, same aircraft, this time a tanking mission. Take-off was at 09.30hrs, and there would be time to spare before establishing the tow line, so the captain decided on a low-level navex to take us to the rendezvous, which was to be Pebble Island, at the northern tip of West Falkland, some 90 miles from Stanley.

The crews seem to have a reasonable degree of autonomy in deciding such things, and make the most of their opportunities to practice certain skills. Low-level it was, too, on a brilliantly sunny, crystal clear morning, our shadow seemingly bigger than the aircraft itself, rushing along the green and grey terrain at 230kts. Bluff Cove and Fitzroy Inlet flashed by, blue, windswept water just below the wing and the red and white prop tips. Across a white beach, with hundreds of penguins; East Cove, and the Merchant Providence; MPA to the right and slightly above us with its huge clouds of white dust as we followed the contours to the south of it. Ahead, a dozen or so buildings — Goose Green, the largest town I'd seen outside of Stanley. A quick snap and it had gone. Bill dropped the Hercules down even lower as we reached the Falkland Sound between the two islands, looking for a small gap in the cliffs on the far side which would let us into A4 Alley, down which the 'Argies' had flown to attack the British ships. There it was, dead ahead. Bill tipped the Hercules on its starboard wing tip, and through we went, with the aircraft being hauled round in the steepest of climbing turns to avoid the sheer green hill just inside the gap, up into the Alley itself, with hills rising well above on both sides, quite close in. Really thrilling stuff this. Not much room for error. Might be bounced by a Phantom or Harrier I'd been warned. A Herc can sometimes out-turn a Phantom at low-level, but not a Harrier! We come to the top end of the Alley, pop over the hill, down to the Sound opposite San Carlos. Then, the hills ahead and climb to 4,000ft, all quite and calm up there after the bumping, bouncing, twisting ride.

There is time for a stooge along the tow line pattern, and in such perfect conditions, the whole of The Falklands are visible, everywhere very green and blue. Surely those stories about the weather can't be true? I'm assured it can change in minutes. We head east, and our customers appear off the port wingtip — two grey Phantoms of No 23 Squadron.

The Air Loadmaster looks after the refuelling equipment, and Sammy called me down the back to watch the hose pay out from the huge drum on the rear ramp. Once the first Phantom had successfully 'prodded', I was allowed to crawl up the ramp, the drum only inches from my shoulder and head, just managing to lean far enough across to look through the small hose outlet, keeping a wary eye on any sideways movement of the hose which occurs if either aircraft yaw. There isn't much room to wield two cameras — hold them sideways, press and hope. No 1



Above left
VIP flight to MPA: ZD952's flightdeck with Defence Minister, Mr Heseltine, in the co-pilot's seat. Left is the aircraft's captain, Flt Lt Marsall, and right is flight engineer Sqn Ldr M. J. Cawsey.
Photo via Sqn Ldr Cawsey

Above:
Escorting the inaugural TriStar flight to Mount Pleasant Airfield was No 23 Squadron Phantom FGR2, XV495.
Photo: Sqn Ldr Cawsey

leaves us, replenished, the hose winds itself further out as he disengages. No 2 moves in. Its all very tense, with Sammy keeping a close eye on things. Then — bang — he's engaged first go, and the drum takes in the slack with a rumble. The Phantom looks so close, bobbing gently along behind, streaming grey vortices from its wingtips. A few more photos, getting cramp in the twisted position, slide backwards down the ramp, carefully avoid the drum, scuffing shoes, grazing elbows; then a few shots of the other Phantom from the side window as it rides alongside waiting for its partner. A few moments later with 9,000lb of fuel dispensed in about five minutes, they are gone. What an experience. Time to return to base.

But its not over yet. The Hercules gets another call to stand by for more custom, and — lo and behold — two Harriers appear for a top-up as we set up a tow line racetrack pattern just north of Stanley, out over the sea. What a bonus this is! Another trip to the back, scramble up the ramp, a few photos of the first Harrier taking on its fuel, then back to the cockpit to see its partner off the port wing. The pilot sees my hand signals and obligingly positions alongside for my cameras before he, too, drops back for a top-up.

We land back at Stanley after 2½ hours of really thrilling flying — everyday stuff to the Hercules crew, of course, but not to me.

That was to be the end of my fixed-wing flying, at least until the return Air Bridge, which does the northbound Stanley-Ascension run in 11½/12hrs without in-flight refuelling, helped by prevailing southerly winds. Until then, however, I had another couple of days' flying to come, this time in helicopters. More of that anon.

Mount Pleasant Airfield (MPA)

Two days were spent visiting the new airfield which was being made ready to accept the first TriStar proving flight, then two months away. The official opening by HRH Prince Andrew on 12 May was well reported in the media. At the time of my visit the five mile centre section of the 30-mile road linking MPA with Stanley was still under construction, which meant a long, bone-jarring detour over the roughest of tracks across open country in a Land Rover driven by a newly-appointed civilian police chief of the islands, Supt Ken Greenland. Ken had previously done a tour down there as Provost Marshal. We stuck to the rules and went in convoy with another vehicle, a Mercedes 'CV' driven by the then current Provost Marshal, Maj Mike Collier, RMP. The precaution was a wise one, as several times his CV had to come to the rescue of the Land Rover. The journey took 3½ hours and brought home the sheer emptiness and bleakness of the Falklands. The route taken both ways was, in effect, that which the southern sector of the land forces had to take after the landings. Their difficulties must have been immense, the countryside alternating between peat bog and rocks, virtually impassable by vehicles in parts, with not a tree or hedge in sight; and the weather then was far less pleasant than the glorious sunshine with which we were blessed. Stopping for a break on a ridge overlooking Bluff Cove and Fitzroy, it was pointed out where the *Sir Tristram* and *Sir Galahad* had been caught by the Argentine bombers with such tragic results. There were other landmarks of the war to be seen as the 'convoy' tortuously progressed towards MPA, which was marked by a huge permanent white cloud on the horizon from many miles away, the dust from the earthworks. The new airfield is indeed an impressive project, and one cannot but marvel at the achievement of its creation within a mere twenty months from a greenfield site. Like many I have to ask: to what avail? It is difficult to accept that it will enhance the future of the islands, though it will obviously facilitate military logistics for as long as that need exists. Whatever the merits or otherwise of the decision to build MPA, the project will rank as one of the world's major, perhaps not volumetrically, but certainly logistically and in speed of creation from conception. It has been an epic indeed for all involved, reflecting the very best of British initiative and endurance, and recreating the old pioneering spirit. For that is what those first men ashore at South Cove were — pioneers in the truest sense. The staff appointed were picked for just that. The time scale from the end of the war to the opening of MPA is quite incredible in this day and age. Bearing in mind the stated cost of the project — £276million for the airport and navaids, plus £119million for the Army facilities and new port (Sept '84 prices) the government, and its Property Services Agency (PSA), moved with great alacrity. So did the contracting consortia of Laing-Mowlem-Amey Roadstone (LMA) (airfield) and Wimpey-Taylor Woodrow (WTW) (army sites). The major decision to build a new airfield rather than develop Stanley was taken only four weeks after the Argentine surrender, and the MPA project was announced about a year later — 27 June 1983 on completion of survey and a site selection by a small party of PSA, Army, and RAF experts.

To describe the chosen site as 'green field' (to use civil engineers' parlance) is an injustice; it is a mixture of peat bog, rock, and water holes about five miles from the coast, lying on a flat plain halfway between Stanley and Goose Green. There were no roads, ports, or any other sort of facilities outside Stanley. The only sign of civilisation for many miles was a small, white derelict shepherd's hut at the crest of the featureless, windswept tract, known as 'Mount Pleasant House'. It provided a modicum of shelter for the recce team, and the name of the new airfield. Nearby were ample supplies of rock and stone to meet construction needs; other than water, however, every commodity needed for the new creation has had to be brought out from England, estimated at over ½million tons.

The advance party of PSA and construction companies' personnel and their prime movers arrived off East Cove late October 1983 in the ship *Merchant Providence*. It took three weeks to establish a very basic jetty to which the vessel could be secured to act as living quarters and working base from which everything could move out-

Above.
TriStar ZD952 on the apron at MPA and in front of the 'TriStar' hangar as it is known. There is plenty of evidence of unfinished earthworks.
Photo: Cpl Readshaw/RAF Brize Norton

Right:
A fine shot of TriStar ZD952 taking-off from MPA on a training/calibration flight.
Photo: Cpl Readshaw/RAF Brize Norton

wards, including the heavy plant needed to make some sort of road up to the airfield site. This task alone, four miles over virgin peat and bog, often in the most atrocious weather conditions (despite it being 'summer' in the Falklands) gave a good indication of what lay in store. By Boxing Day 1983 the track had reached March Ridge, the southern boundary of the new airfield, of which the first sod was cut on the last day of 1983, 24 hours early! It took six months to establish decent living quarters for the pioneers, and enable them to escape the dreadful conditions aboard *Merchant Providence*, and to create the labour camp to accommodate up to 2,000 workers and staff.

The construction task has been enormous: some 2½million tons of excavations on the airfield, 30ft deep in places to get to bedrock; 1½million tons of filling; plus about half those quantities for the road to Stanley. At MPA there will be 100,000 square metres of buildings when all phases are complete. Phase 1 (an operating airfield with main runway of 8,500ft, power station, air traffic control facilities and landing aids, airfield lighting, main hangar, half apron area, usable road to Stanley) was ready on schedule, just 22 months after placement of the contract by PSA; a feat little short of miraculous. In the brochure issued to commemorate the opening of MPA, Mrs Thatcher, the Prime Minister says of this achievement: 'I pay tribute to the skills, efficiency and determination of everyone involved in building Mount Pleasant Airport. This is a triumph for which both Government and private industry can take credit. It speaks volumes for what the British construction industry is capable of achieving in difficult conditions around the world. It will also bring renewed assurance to people of the Falklands Islands'.

The remaining work on the second runway (5,000ft) and associated airport facilities is due for completion early 1986, with the army works following by early 1987. The 'facilities' will include some permanent accommodation for servicemen, including, it was said, a school. So — who knows — there may be longer term postings ahead, perhaps even 'accompanied', though quite what attractions there would be for dependants were not too obvious. The journey from MPA to Stanley is still a long haul — two hours by RAF coach limited to a strict 15mph along the as-yet unmetalled road (and likely to remain so for some time I suspect). The attractions of Stanley, too, may be described as rather basic. Whether any sort of tourist trade develops remains to be seen, but it seems somewhat unlikely.

On completion Mount Pleasant will be capable of accommodating a population of 10,000 (compared to Stanley's 1,000, and the islands' total of only 1,800). It will be entirely self-sufficient, with its own power, water, and sewage plants, plus shopping and leisure complex. What will be its role in, say, 10 years' time, I wonder?

It will be a while yet before aircraft maintenance and handling facilities at MPA are complete, and in the meantime, the Phantoms and Hercules will soldier on at Stanley. It is assumed that Stanley itself will gradually return to light civil use, plus perhaps some helicopters, but this looks likely to be some time away yet. For the present, it must surely be one of the busiest military airfields in the western world, and certainly one of the most interesting and exciting I have been privileged to visit.

To be continued

AirMAIL

DC-3 in Costa Rica

Sir,

As the 50th anniversary year of the Dakota draws to a close, I am writing to let you know of a regular service still operated by this illustrious aircraft. Here in Costa Rica, Central America, the local airline SANSA (*Servicios Aerolineas Nacional SA*) operates an internal network using the DC-3 to either inaccessible or distant points within the national borders over some of the most beautiful scenery the writer has had the good fortune to view. The routes vary from strips on agricultural plantations to the main international airport and a recent flight in the DC-3 illustrates these contrasts

The early morning departure by DC-3, TI-SAG, from Juan Santamaria International Airport outside the capital city of San José, took this aircraft over the mountains in central Costa Rica down on to the coastal plain and into an airstrip lined with sugarcane standing as high as the aircraft itself. A grass runway and a none too generous allowance either side of the aircraft's wings added to the 'rustic' sensation. A look at the watch revealed that only 18min separated these two completely different locations. A swift turnaround then ensued before a 6 min flight to a second rural location, but not before a Piper Pawnee aircraft spraying the crop had converged on the DC-3 on take-off. Visual contact is only possible once the aircraft taking-off is airborne because of the crop!

A swift turnaround again at the next stop, the home of another Pawnee, soon saw us on the next 27min part of the journey to the Atlantic Coast town of Simon. The landing-site is parallel to the beach and comprises the runway, perimeter fence and several sheds for passenger use. Flights into Simon are only undertaken in the early morning as hot weather combined with the aircraft's age prevent safe operations after this time. The aircraft are also needed elsewhere. Even here, the end of the journey for most passengers, the stop over was only 6min before the 32min flight back to San José

It was during this part of the flight that I was privileged to visit the flightdeck and see for myself the panorama, and problems, of these routine flights for the crews. The weather was perfect for the flight but slipping between volcanoes and through passes in poor conditions gives the imagination food for thought. Tragically such an accident occurred last year although no passengers were being carried at the time

The aircraft I was privileged to fly in was delivered to Costa Rica nearly 40 years ago where it saw service with Lacsa, Costa Rica's international airline, before being passed to SANSA. Subsequently re-engined, the DC-3 has great affection bestowed upon it by its crews here and this particular example has, no doubt, still some service to see before it is finally retired

S. W. BOND
San Jose

Typhoon extra

Sir,

I have just read my September edition of 'Aircraft Illustrated', and as usual enjoyed the contents very much indeed. However, as a 'devotee' of the Hawker Typhoon — being a former member of No 263 Squadron during the last war — I regret to have to point out that, as excellent as the article by Kenneth Wixey may be, for some reason he has included some errors in the list of squadrons at the end

There were 29 Squadrons operational with either Fighter Command or the 2nd Tactical Air Force during those years — as listed by Mr Wixey — but he has included Nos 33, 54, 80 and 274 Squadrons which did NOT fly Typhoons at all, and excluded Nos 4, 186, 257 and 268 Squadrons which DID operate with Typhoons

However, I did enjoy the article and have included the magazine with my Typhoon archives

I J. W PUGH,
Wendover, Bucks

Sir,

In his otherwise excellent article on Typhoons in the September issue of 'Aircraft Illustrated', Mr Wixey repeats the widespread myth that the tail failures were cured by fitting 'fishplates' around the transport joint

As one time Hawker test pilot, I can advise that in fact this was a shot-in-the-dark measure and failures continued on so-modified aircraft The fault was finally traced to fatigue fracture of one or other of the elevator mass-balance brackets which, when it happened, resulted in the elevator flutter which brought the tail off.

Modification to the brackets cured the problem and no further failures occurred.

R. P. BEAMONT CBE, DSO*, DFC*, DI FRAES
Salisbury

AirVIEW

Peter R. March

Dove reaches 40

Shortly after midday on Wednesday 25 September, a quartet of de Havilland DH104 Doves flew overhead the British Aerospace factory at Hatfield in salute to the 40th anniversary of the maiden flight of the first British airliner to be built postwar. The flypast also marked the 65th birthday of the founding of the de Havilland Company. Leading the formation was Rodney Small flying the newly restored Dove 6 G-ARDE, which has been painted in the colours of a BOAC trainer, followed by a trio of ex-RAF Devons — G-DVON/VP955 flown by Lionel Thatcher of the 955 Preservation Group, G-BLRB/VP962 in the hands of Vic Norman and G-BLRN/WB531 flown over specially from its base at Rotterdam. Operating out of Cranfield, the Doves also flew over Luton before returning to the Bedfordshire airfield, where they were joined by BAe's Dove 8 G-ASMG.

Designed by R. E. Bishop and his team as a replacement for the Rapide, the DH104 was the first product of the Brabazon Committee that drew up specifications for a full range of postwar airliners. The appropriately named Dove met the Committee's specification VB for a mini-airliner, which was detailed in Air Ministry specification 26/43. Manufactured during the closing stages of the war, it was an all-metal, low-wing, tri-gear, short-range, 8-11 seat airliner powered by two 330hp DH Gipsy Queen 70 supercharged engines. Just a few weeks after the ending of hostilities in the Far East, on 25 September 1945, G. H. Pike took the prototype G-AGPJ into the air for the first time at Hatfield.

Some modifications were made, including a dorsal addition to the fin, as a result of the test-flying that followed the first flight. Production soon got under way, but anticipated sales to UK airlines failed to materialise, largely owing to the relatively high purchase price of the all-metal aircraft and its increased operating costs by comparison with the Rapide, of which there was an abundance of war-surplus examples. By contrast it attracted orders from overseas airlines including South African Airways and West African Airways and was also purchased by oil companies in Iraq and Burma for communications duties.

The RAF saw the potential of the new aircraft as a VIP communications aircraft and initially ordered 50 (later reduced to 30) Dove 4s to meet Air Ministry specification C13/46. The first Devon, as it was called by the RAF, VP952 was the 48th production aircraft and flown in 1948. It was fitted with seven seats and operated by a crew of two, first deliveries going to No 31 Squadron at Hendon. After the first 30 Devon C1s (VP952-VP981) further aircraft were acquired for operation overseas and by the RAE and ETPS; these included WB530-535, WF984, XA879-880 and XG496. In 1955 the Royal Navy became a Sea Devon C20 operator, when 10 aircraft (XJ319-324 and XJ347-350) were obtained to equip No 781 Squadron at Lee-on-Solent; the following year three more (XK895-897) were added to the communications fleet. A handful of Devons and Sea Devons remain in service today, although the majority of the surviving aircraft had been sold to civilian operators by the end of 1984.

In the early-1950s demand for the Dove was beginning to build up and in 1951 a second production line was opened at Hawarden, Chester. In the UK the mini airliner saw service with Cambrian Airways, Hunting, Morton Air Services, Olley and even BOAC (as a crew trainer). The Ministry of Transport's Flying Unit also had a fleet of Doves for pilot examination and to test airfield approach aids. The largest overseas purchaser was Argentina with 70 aircraft being delivered mainly to the government for military use.

Developments of the Dove mainly concentrated on improved engine performance and special fittings for various kinds of aerial work and executive use. In the US modifications were made to the Dove by several dealers, the most outwardly significant being the Riley Corporation which undertook some major redesign work which included a swept fin and rudder together with a pair of 400hp Lycoming engines.

The final production version was the Dove 8 which first appeared in 1960, when the prototype G-APYE was flown. It had 400hp Gipsy Queen 70 Mk 3 engines fitted with exhaust thrust augmenters, a luxury six-seat VIP cabin and a revised cockpit with a Heron-style raised roof. Surviving RAF Devons were modified to the Mk 8 standard and entered service as the Devon C2; the MoD(PE) and RN aircraft remained in the original configuration. After a production run of some 542 Doves at Hatfield and Hawarden (the best selling British transport aircraft until overtaken by the Islander in the mid-1970s), the last aircraft was delivered in 1968. In 1985 some two dozen Doves remain registered to civilian owners in the UK of which 10 are ex-Devons or Sea Devons. It is hoped that a significant number of these will still be around in 1995 when the Dove celebrates its half century.

Preservation view

There appears to be some uncertainty concerning the **Hispano HA1112 G-BJZZ**, that we illustrated last month, newly arrived at Sandown, where it was thought to be under restoration for Robs Lamplough. The New Zealand publication *Wings* stated authoritatively in its July edition that 'Alpine Classic Aircraft Restorations of Wanaka have acquired a Messerschmitt 109 from a United Kingdom collection for restoration to original Bf 109G-2 configuration. Due in New Zealand in four months time, the aircraft was manufactured in Germany in 1944 and was one of 200 railed to Spain to be assembled by Hispano Aviacoa as a Bf109G-2. However a shortage of Daimler-Benz engines due to Allied bombing of the German factory led to the Spanish fitting a Hispano-Suiza V 12 engine for Spanish Air Force use. This proved unsuccessful and, instead, a Rolls-Royce 500/45 V 12 Merlin was used to engine the Ha 1112M-1-L-C4K, as the aircraft was designated with the Spanish Air Force.

'Operated in this configuration by the Spanish Air Force into the late 1960s, the fighter became one of several sold to a United Kingdom buyer for the classic 'Battle of Britain' film. Sold afterwards to the United States, it returned to the United Kingdom in 1979 for the airshow circuit. A minor landing incident resulted in the Messerschmitt being placed on display in a London museum until its sale recently at the museum's closing auction to well known United Kingdom collector Rob Lamplough who, in turn, has contracted to sell the aircraft to Alpine Classic Aircraft Restorations'

The foregoing suggests that G-BJZZ will not be returning to the UK air show scene. However, it was reported previously that Robs Lamplough had already acquired another Ha 1112 and a Daimler-Benz engine to fit to it: perhaps this aircraft will remain in the UK after its restoration has been completed.

Steady progress is being made with Charles Church's **Spitfire restorations** at his workshop near Winchester. Single seat Mk IX TE517/G-CCIX is out of the fuselage jig, while the ex-Israeli single seat PT462/G-CTIX has taken its place and is being converted on restoration to a two-seater. A third aircraft has now arrived, the T Mk IX PV202/G-TRIX which Steve Atkins had been working on. This is being used as a pattern aircraft for PT462 and it seems probable that it too will be completed in this workshop. It is good to see this second Spitfire restoration line in full swing, and clearly benefiting from the manufacture of new components by several large companies. While waiting for his 'new' aircraft, Charles Church is flying a Pilatus P-2 G-CJCI, being a visitor to Abingdon's display on 14 September in this aircraft which he acquired from Doug Arnold.

It appears that Mr Arnold has surprisingly disposed of other aircraft from his collection. It is reported that on 18 September his **P-47 Thunderbolt** N47DE/G-BLZW arrived at Duxford to join Stephen Grey's collection. Within a few days it had been dismantled and crated for shipment to the US. Mr Grey has a P-47 under restoration at Chino, Ca which was due to arrive in Europe before the end of this year. At the same time there have been several reports of the arrival of three further P-47s at Bitteswell for the Warbirds of GB. One of this trio is said to be in excellent condition. Stephen Grey is also reported to be acquiring one of Doug Arnold's Spitfire XIVs MV293/G-SPIT, to bring his collection up to three aircraft — adding to LF IXe ML417/G-BJSG already flying and LF XVIe TB863/G-CDAN under restoration at Booker.

Above right:
Dove anniversary flypast — G-ARDE, lead aircraft and G-BLRN seen from VP962 en route to Hatfield. *Photo. Andrew March*

Right:
Dove line-up at Cranfield on 25 September with (left to right) G-ARDE, G-BLRN, VP962 and VP955. *Photo. Andrew March*

Right:
One of two Tomcat units deployed on USS *America* is VF-33 as represented by BuAer No 159446, 'AB-212'.

Below:
A-7E Corsair II, BuAer No 159996 'AB-404' of attack squadron VA-72, overshadowed by the *America's* massive 'island'.

Below right:
Twenty-five-ton E-2C Hawkeye, BuAer No 161097 'AB-600' of Carrier Early Warning Squadron VAW-123. Photos: Roger Wasley

America comes to Britain

THE US Navy displayed an example of its awesome sea-going air power when the USS *America* (CV-66) sailed into the Solent during late-September. The huge 80,000-ton *America* anchored in Stokes Bay for a goodwill visit after taking part in the multi-national NATO exercise *Ocean Safari* in the North Atlantic. The *America*'s varied complement of aircraft saw a great deal of 'action' during the exercise, playing a constant cat-and-mouse game with Soviet forces.

Aboard the *America*, the fifth ship to carry the name, were nearly 80 aircraft, both fixed-wing and helicopters. There are nine squadrons attached to Carrier Air Wing One flying seven different types of aircraft made up as follows:

Fighter Squadrons.
- VF-33 F-14A Tomcat (NAS Oceana, Va)
- VF-102 F-14A Tomcat (NAS Oceana, Va)

Attack Squadrons:
- VA-34 A-6E Intruder (NAS Oceana, Va)
- VA-34 KA-6D Intruder (NAS Oceana, Va)
- VA-46 A-7E Corsair II (NAS Cecil Field, Fl)
- VA-72 A-7E Corsair II (NAS Cecil Field, Fl)

Carrier Early Warning Squadron:
- VAW-123 E-2C Hawkeye (NAS Norfolk, Va)

Air Anti-Submarine Warfare Squadron:
- VS-32 S-3A Viking (NAS Cecil Field, Fl)

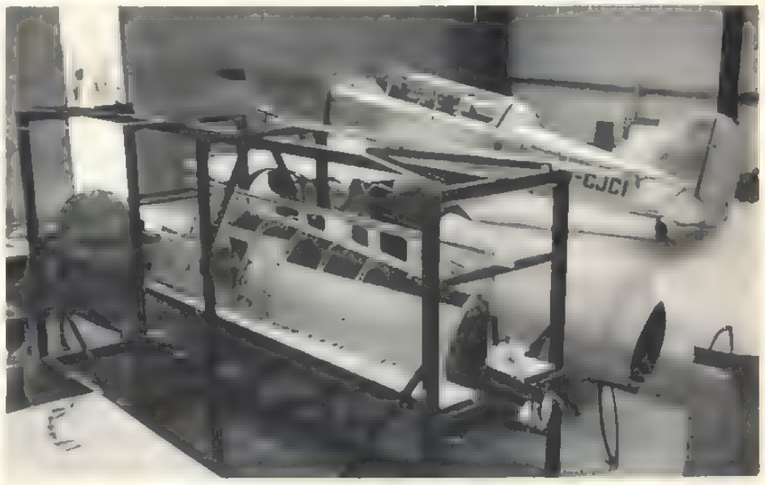
Tactical Electronic Warfare Squadron:
- VAQ-135 EA-6B Prowler (NAS Whidbey Island, Wa)

Helicopter Anti-Submarine Warfare Squadron:
- HS-11 SH-3H Sea King (NAS Jacksonville, Fl)

The *America* was launched on 1 February 1964 and made three deployments to Southeast Asia. It was one of four aircraft carriers on *Yankee Station* when the Vietnam Peace Agreement came into effect in January 1973.

During a deployment to the Mediterranean the following year, the *America* completed more than 8,600 accident-free launches and recoveries as well as supporting friendly forces during the Cyprus crisis. In 1981, during her first deployment to the Indian Ocean, *America* became the first carrier since the Six-Day War in 1967 to transit the Suez Canal.

The *America* conducted initial carrier qualifications for the F/A-18 Hornet and, like all US carriers, boasts some impressive statistics. Overall length is 1,047½ft, the flight deck covers 4.57 acres, the carrier can produce more than 200,000hp and top 30 knots. The two anchors each weigh 30 tons and the crew, including members of the Air Wing, totals more than 5,000. The *America's* four powerful catapults can each send a 44,000lb aircraft from 0 to 180mph in just 260ft! With her formidable air power plus Sea Sparrow missiles and Phalanx close-in weapons system, the USS *America* is well-equipped for self-defence and able to deal a mighty blow to any adversary.



Right
Spitfire TIX, PT462 (in the jig), and PV202 alongside with Pilatus P2, G-CJCI at the end of September. *Photo: Peter R. March*

Right:
Skyraider F-ZVMM/OO-SKY on arrival at Brasschaat, Belgium. *Photo: F. Ceulemans*

Another warbird that had disappeared from European skies and is now making a welcome return is the **Skyraider**. Following the two examples flown at La Ferte Alais, France this year, another aircraft has turned up in Belgium. Carrying F-ZVMM for the ferry flight from France to Brasschaat it was subsequently registered OO-SKY to a Mr Vormezeele who plans to fly it at air shows next summer. It will retain its *Armée de l'Air* colours and serial 126965.

The **Museum of Army Flying** at Middle Wallop took delivery of a new exhibit on 2 October — an all-white Beaver AL1 XP821. The aircraft was delivered from storage at RAF Shawbury in a dismantled state aboard a low-loader. XP821, one of 42 Beavers acquired by the Army Air Corps, has earned a well-deserved place in the museum. This particular aircraft, c/n 1484, first flew on 3 November 1961 and was delivered to 2MU on 16 November for shipment to Seletar and taken on charge by 11 Flight/No 656 Squadron on 1 February 1962.

The aircraft went to 390MU on 13 March that year but returned to No 656 Squadron by February 1964. XP821 served in Borneo until going back to 390MU on 22 January 1966. The Beaver was on 130 Flight strength from 30 October 1967 until October 1970 when it was flown to Vientiane, Laos for British Embassy use.

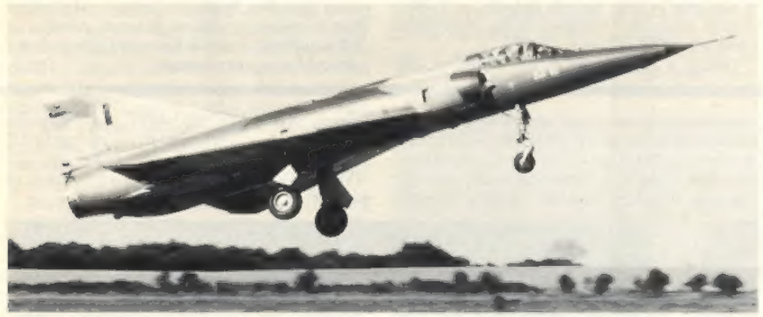
The detachment at Vientiane was started by 130 Flight, RCT, in the late-1960s, but when the Flight disbanded in 1970, XP821 stayed on in Laos.

The aircraft still retains its distinctive paint scheme from those days in Laos, being white overall with light grey undersides to the fuselage and above the fin flash are the black letters 'MCO' (the aircraft's call-sign) and above them is a small Union Jack. The passenger doors carry the words 'British Embassy' in English with the Laotian equivalent beneath. On return to the UK XP821 went to 19MU in October 1975, then to 5MU at Kemble and eventually to Shawbury.

The **Cosford Aerospace Museum** has now closed for the winter and will not be open at weekends as was formally the case. This is to allow essential renovation work on the buildings to continue. At the same time the exchange of aircraft with St Athan will go ahead. The Me262, Me410 and other 'enemy types' will go to St Athan and the prototype Hunter, Martin-Baker's Meteor and the Jet Provost will go to Cosford; Yeovilton will receive the Sea Balliol WL732 and the Midland Air Museum the Meteor 14 WS838. Sadly the Vulcan B1 XA900 is scheduled to be scrapped as there have been no takers on the preservation side. It is hoped that the Museum will reopen to the public in March 1986.

Reports that an announcement is to be made about the establishment of a **Confederate Air Force Museum** in the UK have abounded throughout the summer. Newspapers in the Midlands have linked this to Bruntingthorpe, the former USAF airfield. The Bader Wing of the CAF has stated that it is discussing with the Walton family, the owners of the site, a project to develop a major museum which will include the construction of a display and workshop hangar. The local council says that planning permission for an aviation museum had previously been granted for the airfield. If the project is to go ahead a decision seems likely to be made before the end of this year. The Manchester Air and Space Museum has closed as a separate institution and has re-opened as part of the Greater Manchester Museum of Science and Technology. To quote the British Aircraft Preservation Society: 'There has been some local concern that this could mean that the museum would become a mere gallery of the general museum and tend to lose its identity as a major aviation museum for the north west of England'.

Finally some brief items. The **Vulcan B2** XM655/G-VULC has been transferred to American ownership and re-registered N655AV. It now comes under FAA regulations. It was refuelled early in October, taking on board some 32,000lb of fuel ready for its departure from Wellesbourne Mountford which was scheduled to be before the end of the month. After a flight-test by the former RAF Vulcan display pilot, it was planned to relocate the delta to another Midlands airfield. Vulcan XM575/G-BLMC at East Midlands airport has been purchased by the Leicester Museums Service and will continue to be exhibited at the airport. The Russavia Collection has obtained a second **Rapide G-AGJG**. Mike Russell plans to continue the rebuild already under way at Duxford. The North East Aircraft Museum has acquired the **Grasshopper glider WZ767** on loan. The Royal Aeronautical Society (Medway Branch) is making good progress with the restoration of Hurricanes LF738 and LF751 for exhibition purposes. Work has now started on the Thunderstreak FU-6.



Airshow 85

The RAF Battle of Britain At Home Days took place during the first half of September. At **RAF Leuchars** the rain just about held off to allow a full show to take place on 7 September. Unfortunately the Red Arrows were reduced to eight aircraft owing to technical problems with one of the synchro pair. For the second year running the advertised E-3A AWACS failed to materialise. Highlights of the static display included a Belgian Air Force Magister MT-35, French Air Force Mirage F-1C 64/30-SP, A&AEE Comet 4C XS235 and Tiger Moth DF155/G-ANFV. In the flying the Tornado F2s created much interest as a taste of the future,

Above left:
Belgian AF Mirage VBA, BA-15, taking-off at Finningley's At Home display.
Photo: John Dunnell

Left:
Air France Concorde F-BTSD at Finningley on 7 September. *Photo: J/T Gravell*

and the Vulcan XL426 provided a touch of nostalgia. Interesting 'civilians' were Miles M18 G-AHKY and Magister R1914. On the same day at **Finningley** the weather was very poor. This did not affect the large crowd which turned up to see a Concorde in the air. What was unusual however, was that the supersonic airliner came from the Air France rather than the British Airways fleet. It was operating a 'supersonic' charter flight from and to Paris. Finningley's varied static display included A&AEE Harvard FT375, RAE Meteor T7 WA662, Sycamore HR14 XJ380, Nimrod AEW3 XZ285, VC10 K3 ZA150 and Mirage F1C 200/12-KL. Civil owned aircraft included Bullfinch G-BDOG, Devon VP955/G-DVON and longEz G-RAEM.

The following weekend it was the turn of **St Athan** and **Abingdon**. Not unexpectedly the former base, which has the Tornado and Harrier overhaul facilities, showed several examples of these types, including new Sea Harrier FRS1 ZD582 prior to delivery to Yeovilton and Tornado GR1 ZD894. MoD(PE) support came in the shape of Viscount XT661 and Canberra WH953, while the most interesting overseas item was RDAF Draken AT-152. Evidence that NDN Aircraft has moved from Sandown to South Wales came in the shape of the Firecracker G-NDNI, Fieldmaster G-NRDC and the Freelance G-NACI. The latter was making one of its first public appearances. At Abingdon the Jaguar MU showed a large number of its inmates in various degrees of strip-down in the extensive hangar displays. Again MoD(PE) aircraft were of interest including the Dakota ZA947, now bereft of its 50th anniversary markings and Farnborough's Jaguar T2 ZB615. Also in the display was Dove G-ARDE which has recently been restored at Cranfield and is painted in the colours of a BOAC trainer. Of note in the flying display was the attractive Spitfire 19 and Tornado F2 display (PM631 and ZD903/B), Belgian Air Force Magister AT-08 and one of the Nimrods (XV255) with wing-tip ECM pods and additional fin-lets on the tailplane.

Duxford's display on 16 September was blessed by good weather which brought out the traditional crowds for this event. Highlights of the flying included solo spots from Ray Hanna's Warhawk, Spitfire and Mustang, a formation display of Mustangs and the B-17 Sally-B, the No 899 Squadron Sea Harrier FRS1, a BAe 146 from Hatfield and a full Concorde routine. There was the embarrassment of a US Air Force pilot giving his display over Cambridge airport instead of Duxford and sadly the Aces High 'Ju-52' had technical problems which prevented Dizzy Addicott from flying it. On the same day the Moth Club had a Fly-in at **RASF Wroughton** which was attended by a dozen aircraft including 'Moths' G-AIYS, G-ANFM, G-BEWN, G-AGZZ, G-BJVE and G-APAM.

On Saturday 21 September the **Andover Strut** of the PFA held an Invitation Fly-in at the Roundwood Farm Strip, Hants. Fourteen aircraft managed the blustery conditions to land at the strip, including Cubs G-AISS, G-ARVO, G-AMEN, G-BLRC, G-BIZV and G-BLMI. Largest aircraft to attend was Twin Comanche G-ASYK while Paul McConnell decided not to land his Waco in the stiff cross-wind. The Tiger Trophy Competition took place at **Dunkeswell** on 22 September. Competitors included Stampes G-ASHS and 'TKC, Jungmann G-BIRI, Nipper G-AWDA and Aerobats G-AYOZ, 'ZKV and G-BACO.

Shuttleworth's annual Pageant on 29 September took place in ideal conditions for once. Virtually all of the Collection's airworthy aircraft were flown, one exception being the Spitfire which had an engine problem. John Lewis had difficulties with the Bleriot and narrowly missed a disaster when it was caught by a gust of wind on take-off. It ended up in the hedge but thankfully neither the pilot nor the aircraft was badly damaged. Also on 29 September a Fly-in was held at the **Inglesham Strip** near Fairford by the Oxford Strut of the PFA. Visitors here included Jodel G-BMIP, Cessna 140 G-AHRO, Tiger Moth T5424 and Mike Wittacker's two microlights, the MW4 G-MBTH and the MW5 G-MMGV. The Dakota Festival at Cranfield on 5-6 October was in fact a Dakota-less Festival. The enthusiasts for the DC-3 were present but there were no Dakotas!

Below:
Ray Hanna getting airborne in the P-40 Kittyhawk for his display at Duxford on 16 September. *Photo: Peter R. March*

Below right:
The Freelance G-NACI made its debut at St Athan on 14 September.
Photo: Peter R. March

AirEVENTS

Air events

The winter gloom will hopefully be relieved by a few fine days which will permit some of the customary balloon meets and fly-ins to take place. Looking ahead to 1986 the Editor will be pleased to receive details of events now being planned, to appear in this monthly calendar as the year goes by. Any event with an aeronautical connection will be included.

November

15 Southampton, Hants: The Second Annual Spitfire Lecture by Group Captain T. G. Mahaddie at the Hall of Aviation, Albert Road South (Tel: 0703 35830)

17 Muswell Hill, N. London: Archive Aviation Film Show by John Huntley, Odeon Cinema (Tel: 01-883 1001)

30-1 Dec Humber Bridge, Humberside: Humber Bridge Balloon Race (Tel: 0969 40674)

December

28-29 Harrogate, Yorks: 5th Brass Monkey Balloon Meet (Tel: 0225 834686)

31 London (Heathrow) Airport: Farewell to the Trident flight, Ian Allan Travel (Tel: 0403 51411)

January 1986

1 Compton Abbas, Dorset: New Year's Day Fly-in (Tel: 0747 811767)

1 Bembridge, IOW: New Year's Day Fly-in (Tel: 0983 872511)

4-5 Marsh Benham, Berks: Icicle International Balloon Meet (Tel: 0344 421527)

19 Finmere, Bucks: Vintage Aircraft Club Snowball Rally (Tel: 02806 207)

February

16 Finmere, Bucks: Vintage Aircraft Club St Valentine's Day Fly-in (Tel: 02806 207)

March

5 Eastleigh, Hants: 50th Anniversary Spitfire Fly-in (Tel: 0703 35830)

8-9 Popham, Hants: Microlight Trade Fair, Recreational Flying Centre (Tel: 025675 733)

15 Duxford, Cambs: IWM Duxford re-opens for 1986 season (Tel: 0223 835000)

April

8-10 Aberdeen, Grampian: Helitech 86, International Helicopter Exhibition (Tel: 01549 5831)

For this month's contributions we would like to thank: P. Arnold, R. Bonser, F. Coulemans, D. Conway, J. Dunnell, J. Guthrie, D. Healey, I. MacFarlane, A. P. March, J. S. Mines, L. Robinson, R. Rudhall, E. A. Shackleton, R. Wasley and R. Wright. Also the publications *Air North*, *Air Scotland* (The West of Scotland Aviation Group), *British Aviation Review* (British Aviation Research Group), *Cotswold Messenger* (Cotswold Aircraft Restoration Group), *DCO* (The Spitfire Society), *Flightpath* (The Cheshire Aviation Society), *Flypast* (Merseyside Aviation Society), *Hawkeye* (Gatwick Aviation Society), *Humberside Air Review* (Humberside Aviation Society), *Irish Air Letter*, *Osprey* (Solent Aviation Society), *Prestwick Airport Letter* (Prestwick Airport Aviation Group), *Scottish Air News* (Central Scotland Aviation Group), *Skyward* (Westcountry Aviation Society), *South West Aviation News* (South West Aviation Society) and *Stansted Aviation Newsletter* (The Stansted Aviation Society).

Note: Main feature articles in bold type.

aircraft illustrated

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